Third generation closed center load sensing is here...today

The time has arrived when you can move up to higher levels of vehicle performance by incorporating the Vickers CMX load sensing controls in your next design. It's no longer necessary to demand that the machine operator demonstrate outstanding skills to obtain maximum performance.

By incorporating advanced state-of-the-art valve element concepts, the CMX provides "velvet smooth" controllability of the raw brute force available from your hydraulic system. No other system offers the flexibility to easily tailor individual function control to your exact needs!

Today's load sensing systems will dramatically reduce the overall power requirements of your machine's hydraulic system by eliminating unnecessary losses when multiple unequal loads are operated simultaneously.

However, care must be taken to insure proper phasing to avoid unnecessary power waste in unequal displacement functions such as typical cylinder applications. Competitive systems require careful and lengthy spool development to match each operating section to its specific functional load requirements. Since each spool must be matched to its individual function, service support is costly.

The CMX family has been designed from the first line on the computer screen with your needs in mind. Thanks to its modular element construction, it can be easily tailored to your exact specifications. Prototype system development and debugging is reduced to a matter of days rather than the traditional weeks or months necessary with competitive designs. On-site service is a breeze. Service and production support inventory is dramatically reduced.

And best of all, it's available today in all the popular basic and optional configurations, just the way you want it. Hydraulic or electrohydraulic controls, mid-inlets, and mixed flow arrangements are just a few of the almost endless features available.

This application guide has been developed to assist in selection of the features desired to meet your system requirements. Consult your Vickers sales representative if special features beyond those shown are desired.

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Detailed description of CMX sectional valves

General description

The CMX sectional valve is a stackable, load sensing, proportional directional control valve, and can be operated by hydraulic remote control (HRC) or electronic remote control (ERC) via integral electrohydraulic reducing valves.

A characteristic feature of the CMX valve line is the concept of separate meter-in and meter-out elements (Figure 1). The meter-in element is a pilot operated, pressure compensated, proportional sliding spool and controls fluid from the pump to the actuator. The meter-out elements are pilot controlled metering poppets, and control exhaust fluid from the actuator to tank. Each meter-out poppet functions as a variable orifice between one of the actuator's ports and the tank port, with the degree of opening proportional to the pilot signal.

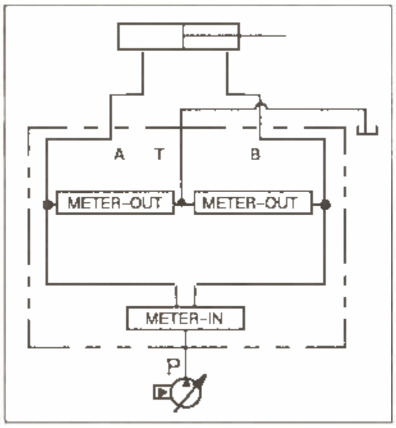


Figure 1. Basic CMX Concept

The separation of the meter-in and meter-out elements, plus the valve's modular design, permits a broad range of control options to meet a variety of load requirements. This is especially desirable for a stackable mobile valve, where a single valve bank must handle many different functions.

The CMX sectional valve family consists of two basic series with different flow ratings - the CMX100 and the CMX160. These valves are functionally identical, with most differences being due to the differences in their physical size.

A CMX valve bank is made up of an inlet body, from one to eight valve sections, and an end cover (Figure 2). The valve sections are connected internally to common pressure, tank, load sense, pilot supply and pilot drain passages. Face seals between the sections seal the connecting passages, and the sections are held together by tie rods and nuts. Threaded mounting bolt holes are provided on the inlet body and end cover.

The pump, tank, load sense and electrohydraulic pilot supply passages are terminated in the inlet body, and the pilot drain is terminated in the end cover. Connections for the actuator and the HRC are made at each section. Electrical connections for electro-hydraulic valves are made at each coil. HRC and ERC controlled valves can be used in the same valve bank.

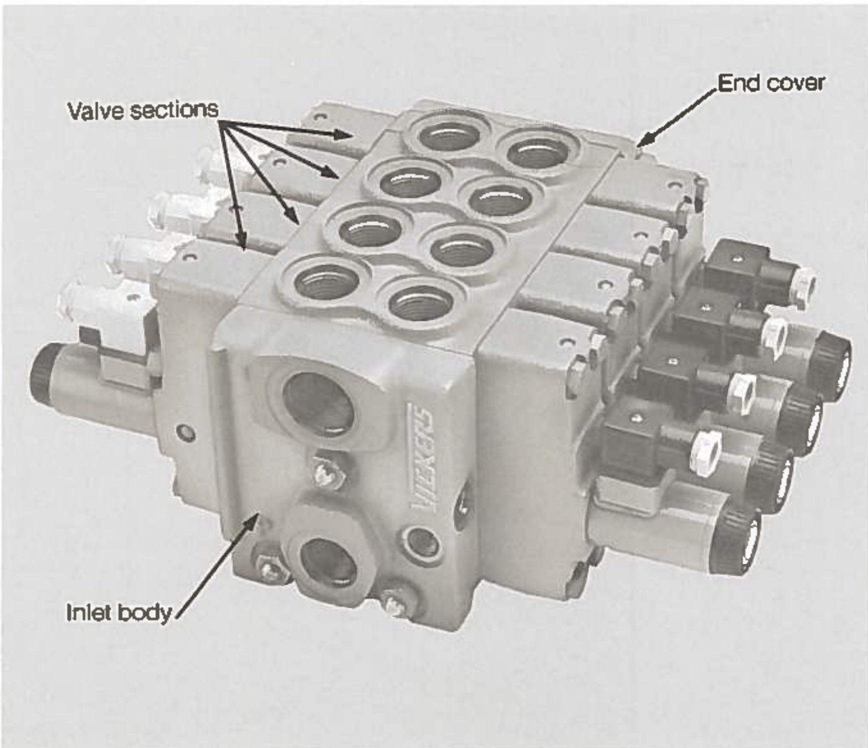


Figure 2

Inlet bodies

Standard end inlet body

The standard inlet body (Figure 3) provides connections for pump, tank and load sense. On electrohydraulic valve banks, a connection is also provided for pilot supply, which may be internal or external. For internal pilot supply, an internal passage connects the pilot supply to the pressure port. For external pilot supply, this connecting passage is blocked by a 1/4-28 UNF set screw (.125 in. hex key) accessible through the pump port, and the "XP" external connection is made through a #6 SAE O-ring boss port (.563- 18 UNF-2B thread). Refer to Port Sizes table at the end of this document for other sizes.

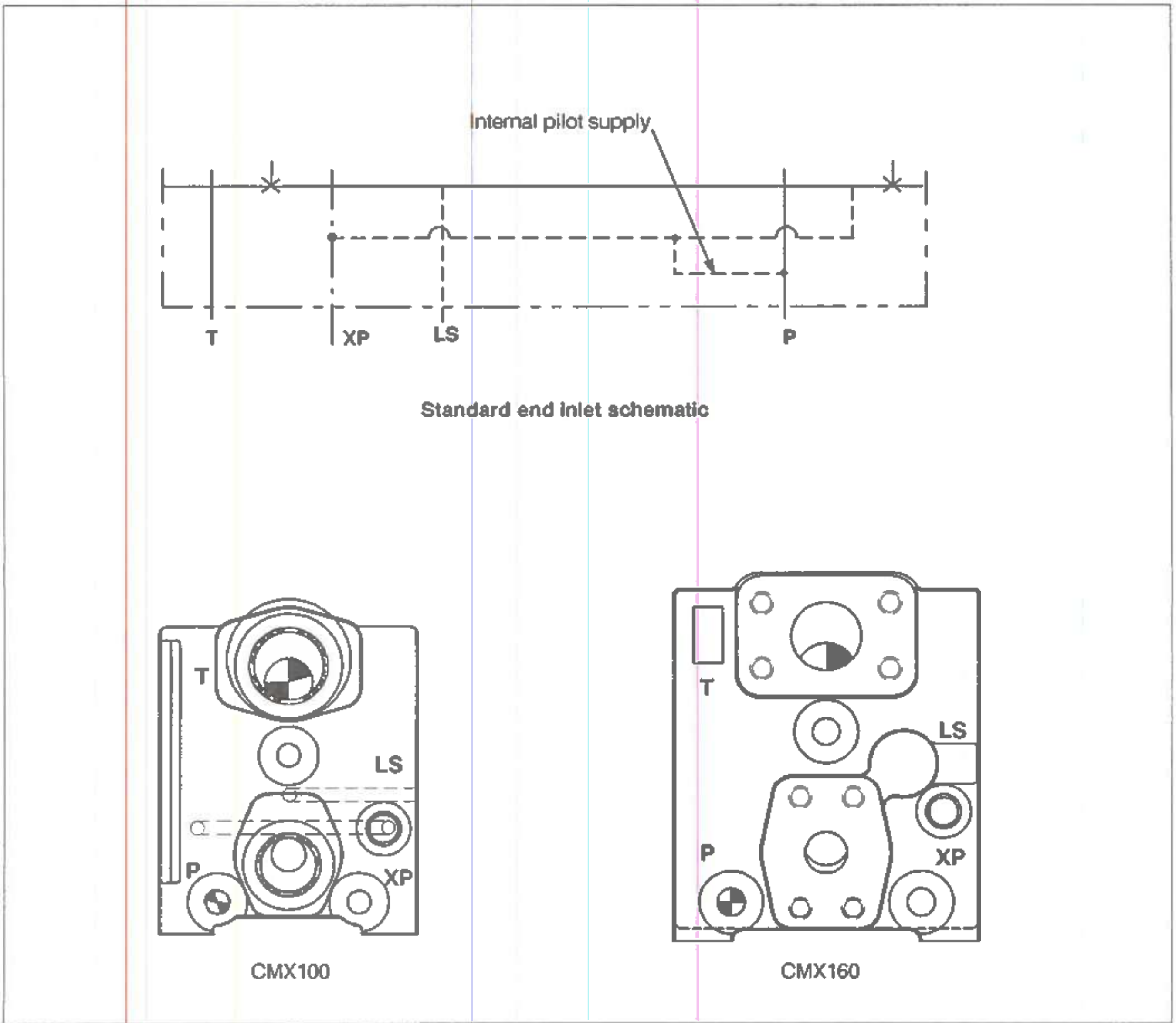


Figure 3

End inlet body with load sensing relief valve (CMX100 only)

This inlet body (Figure 4) is designed for use with fixed displacement pumps to provide a combined function similar to a variable displacement load sensing pump, but at a lower system cost. In addition to the system connections for pressure, tank, optional load sense and optional external electrohydraulic pilot supply, the inlet section incorporates a load sensing relief valve that maintains inlet pressure at a fixed level above load sense pressure, and limits maximum inlet pressure to a preset value.

The load sensing relief valve uses a balanced spool concept to control inlet pressure. Load sense pressure from the valve bank is admitted to the spring chamber via a 1.27 mm (.050") orifice. Load sense pressure plus the spring load is balanced against the inlet pressure on the opposite end of the spool. When the load sense pressure plus spring force is overcome by the inlet pressure, the spool opens allowing inlet flow to tank, thus controlling inlet pressure. When the pre-set maximum pressure is reached in the spring chamber, the pilot poppet opens, limiting the spring chamber pressure (and then the inlet pressure) since the LS flow into the spring chamber is controlled by the .050" orifice. Note that the pre-set maximum pressure must be matched to the spring(s) used, so the spools are not interchangeable.

Two springs are available, which may be used separately or as a nested pair to give three inlet-to-load sense pressure differential settings: 10 bar (145 psi), 16 bar (232 psi) and 26 bar (377 psi). The load sensing relief valve is rated at 250 bar pressure (3625 psi).

An optional solenoid operated unloading valve is also available which provides a direct path to tank when pump "standby" pressure is not desired. The unloading valve provides a 4.7 bar (68 psi) pressure differential at 100 lpm (26 USgpm) and is open "P" to "T" when the solenoid is de-eneregized. The unloading valve is pressure rated at 205 bar (3000 psi).

An optional external load sense connection is available for special applications. Load sense connections from other valve banks should be made at the end cover when a load sense decompression orifice is used to decompress the load sense passage. The load sense decompression orifice should be located as far as possible from the load sensing relief valve (see page 25).

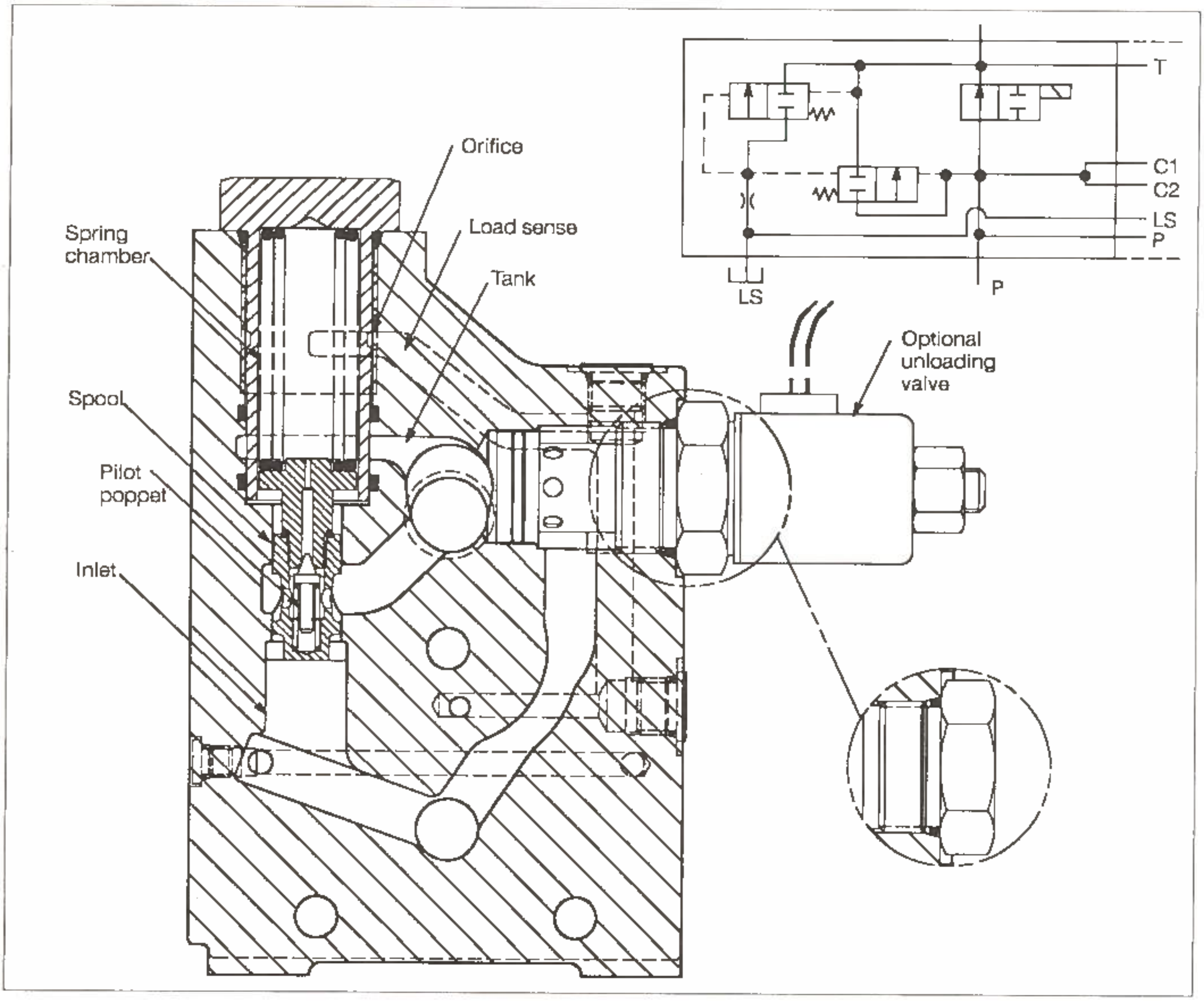


Figure 4

CMX160/100 mid-inlet

The mid-inlet (Figure 5 and 6) facilitates the use of CMX160 and CMX100 valve sections in the same valve bank. The CMX160 sections are mounted on one side of the mid-inlet, and the CMX100 sections are mounted on the opposite side. System pressure and tank connections are made in the middle of the valve bank, rather than on the end.

Standard mid-inlet

The standard mid-inlet (Figure 5) provides connections for pump, tank and external pilot supply (for electrohydraulic valves). Internal pilot supply is available by omitting a set screw plug in a connecting passage between the pump port and pilot supply passage, and plugging the external port. Load sense and external drain connections for mid-inlet valve banks are made at the end covers.

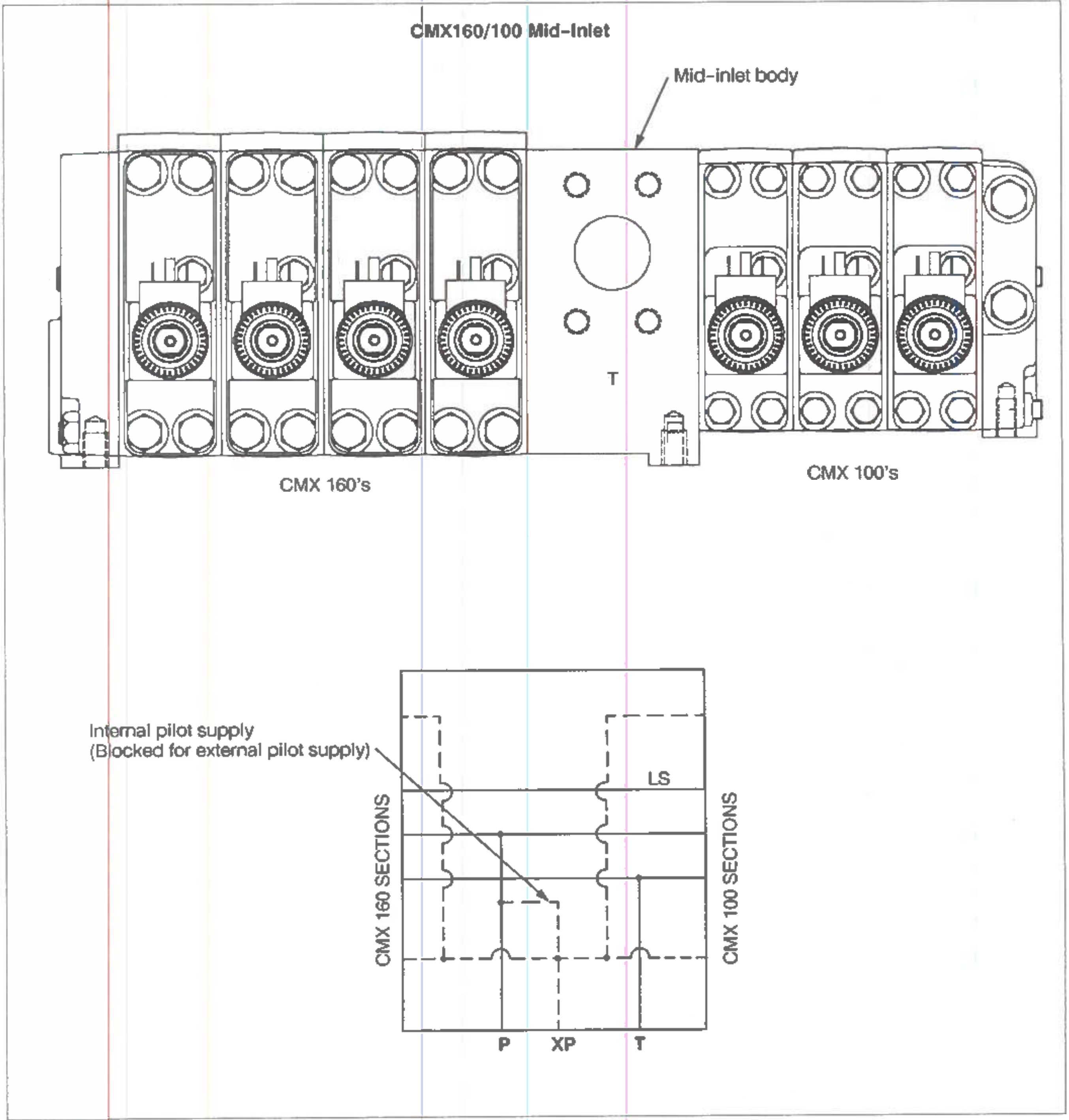


Figure 5

Mid-inlet with reducing valve and anticavitation make-up flow

This mid-inlet (Figure 6) incorporates two reducing/relieving cartridges to provide pilot supply pressure and tank port make-up flow. The reduced pilot supply pressure can be supplied internally to electrohydraulic sections and/or ported externally to HRC pilot supply ports. The tank port make-up flow is directed to the tank passage to maintain a minimum tank pressure under all operating conditions.

Make-up flow is an anti-cavitation feature. It is required in circuits where an overrunning load is causing an actuator to move and draw more fluid from the tank port than is being returned by the opposite actuator port, and a check valve in the tank line prevents fluid from being drawn from tank. (A swing function powered by a hydraulic motor is a typical circuit that requires make-up flow.) The reducing valve should be set 0.69 bar (10 psi) below the back pressure check valve setting.

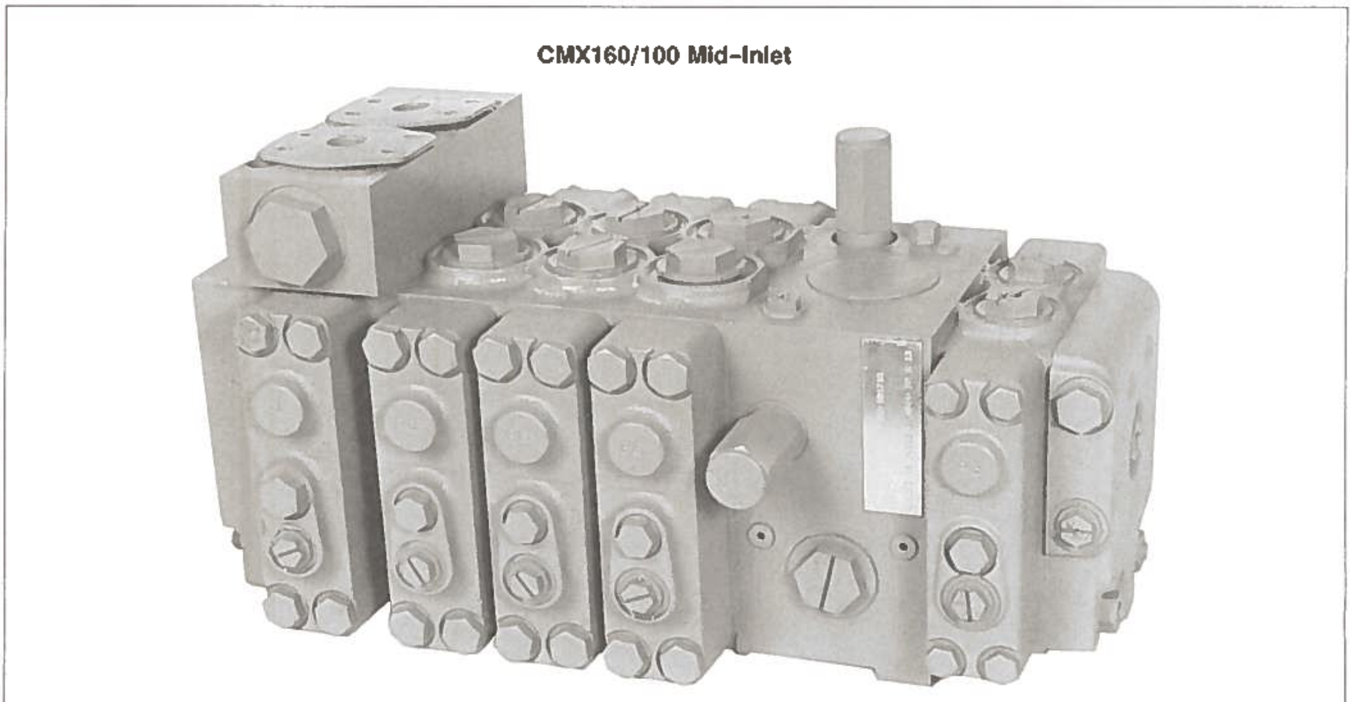


Figure 6

CMX valve sections

The CMX valve section consists of three basic parts: the main valve body, which contains the main flow passages and main control elements, and two control caps, that contain the pilot circuitry. The control cap gaskets (Figure 7), which provide a seal between the control caps and the main valve body, are also part of the pilot circuit, providing a passage from the meter-in spring chamber to the relief valve pilot stage and the meter-out servo. This format allows for a wide variety of control options for relatively few basic parts; thus the valve can be tailored to the application at minimal extra cost.

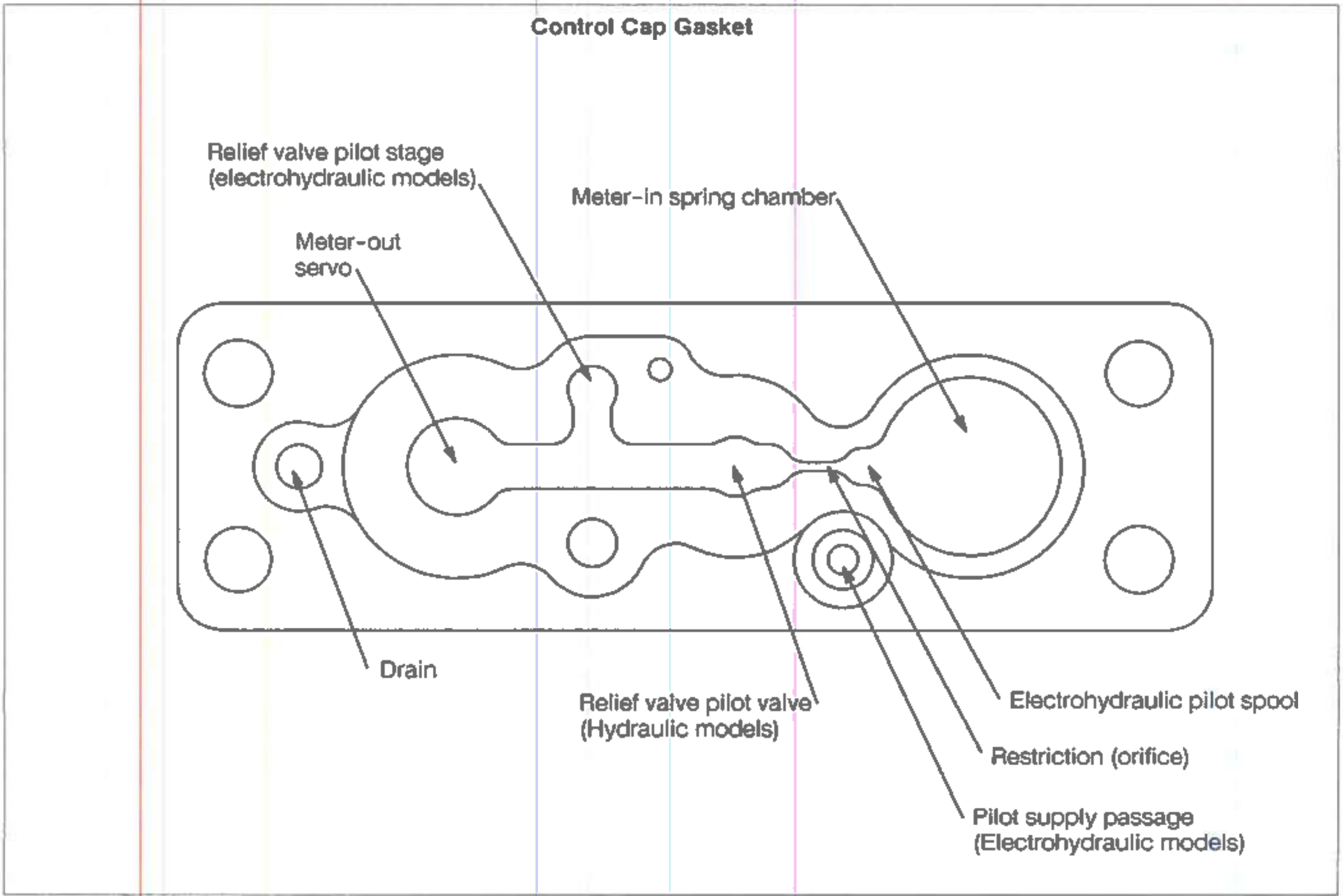
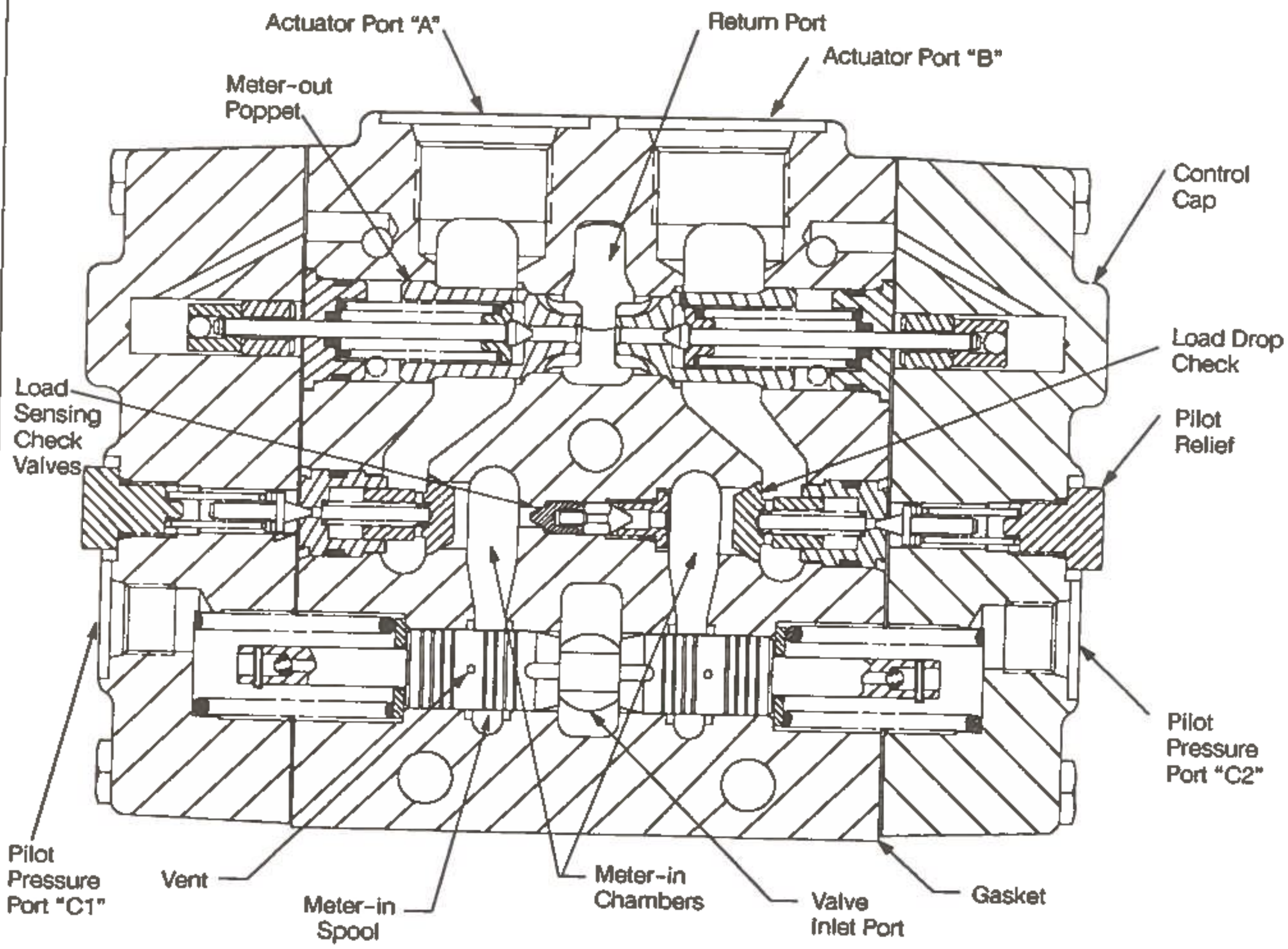


Figure 7

Cutaway views of the hydraulic and electrohydraulic versions of the CMX are shown in Figures 8 and 9, along with schematic diagrams. The relief valve pilot stages are shown in detail in the schematic diagrams used in this discussion to promote a better understanding of the valve's operation.

Hydraulic Cutaway



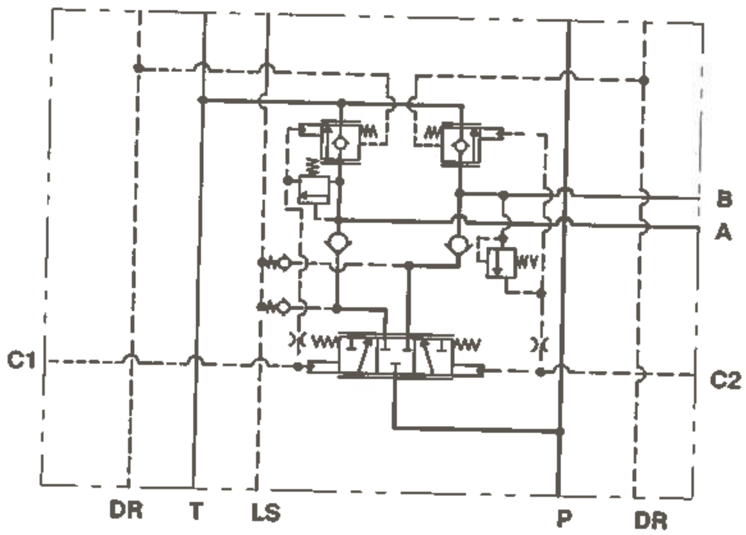
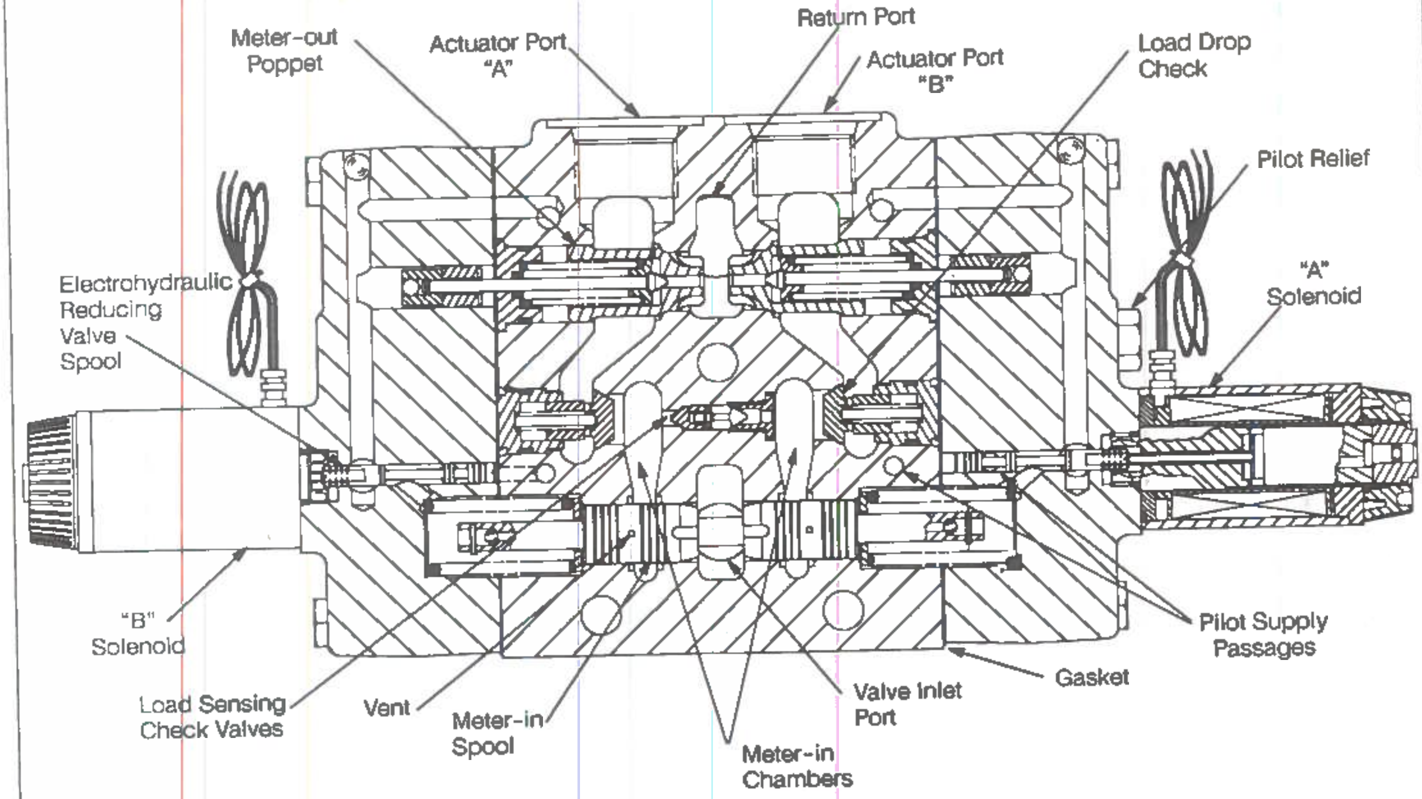


Figure 8

CMX Electrohydraulic Valve Section



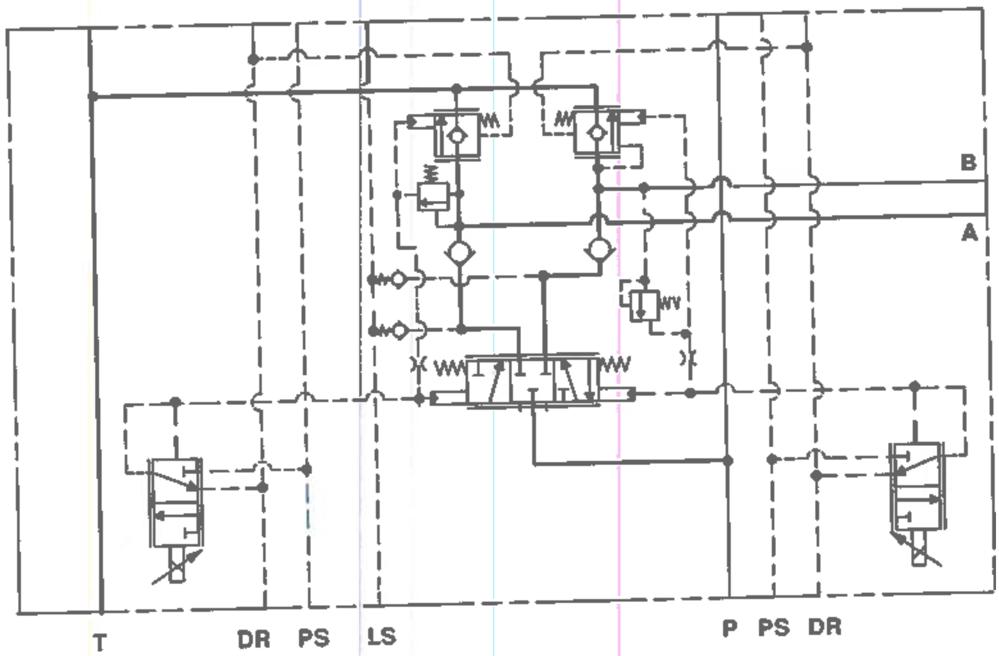


Figure 9

The main valve body is available as a narrow body with an actuator port pressure rating of 250 bar (3625 psi), or as a wide body with an actuator port pressure rating of 380 bar (5510 psi) and an inlet port pressure rating of 350 bar (5075 psi). Valve sections with different pressure ratings can be used in the same valve bank. Pressure ratings and sizes are tabulated below.

Valve series	CMX100			CMX160		
Port code	S	F	FL	S	F	FL
Body thickness	47mm	59mm	59mm	51mm	75mm	75mm
Max. pressure	bar (psi)	bar (psi)	bar (psi)	bar (psi)	bar (psi)	bar (psi)
Actuator port	250 (3625)	380 (5510)	250 (3625)	250 (3625)	380 (5510)	250 (3625)
Inlet port	250 (3625)	350 (5075)	250 (3625)	250 (3625)	350 (5075)	250 (3625)
Drain/tank port	35 (508)	35 (508)	35 (508)	35 (508)	35 (508)	35 (508)
C1/C2 port	35 (508)	35 (508)	35 (508)	35 (508)	35 (508)	35 (508)
Electrohydraulic pilot supply port	250 (3625)	250 (3625)	250 (3625)	250 (3625)	250 (3625)	250 (3625)
Actuator port size	.75" SAE str. thd. O-ring boss (1.063-12 UN-2B thd)	.50" Code 62 SAE 4-bolt flange	.50" Code 61 SAE 4-bolt flange	1" SAE str. thd. O-ring boss (1.313-12 UN-2B thd)	.75" Code 62 SAE 4-bolt flange	.75" Code 61 SAE 4-bolt flange

The operating elements in the CMX sectional valve can be divided into five functional groups: meter-in, meter-out, load drop check valves, load sense check valves and relief valve pilot stages. The electrohydraulic version includes additional solenoid operated proportional reducing valves to provide pilot control pressure. Each functional group is described in the following pages.

Meter-in elements

The meter-in element ports fluid from the valve inlet port to the "A" or "B" meter-in chamber. The meter-in element is a pilot operated, spring centered, proportional sliding spool. The inlet port is closed in neutral. Two different springs are available to provide different meter-in cracking pressures (the pilot pressure required to begin flow from the inlet to an actuator port). The area gain (or slope of the metering curve) is the same for both springs. The meter-in element is available as a flow control type ("S0**") or a pressure control type ("S***").

Low flow spool options are available for both the flow control meter-in element ("L0**") and the pressure control meter-in element ("L***"). The low flow option provides finer metering and lower flow capability than the standard "S***" spool for functions where the full flow capability of the valve is not desired. Low flow spools are available for the CMX100 only.

Flow control meter-in elements "S0" and "L0"

The flow control element (Figure 10) provides nearly constant flow for a given command signal, independent of pressure drop across the meter-in spool and independent of load pressure. Flow is proportional to command pilot pressure differential. Pressure compensation, which is achieved by utilizing flow forces, minimizes load interaction caused by the simultaneous operation of more than one function.

For certain applications such as brake release circuits, single acting cylinders, and counterbalance circuits, it is necessary to drain the meter-in chambers to prevent pressure build-up and subsequent actuator movement. When required, meter-in spools that vent fluid in the meter-in chamber are available. In these "vented" spools, fluid passes through an orifice to the center of the spool to the pilot pressure ports, where it is drained to tank via the HRC (hydraulic pilot models) or the reducing valve (elecrohydraulic models). Ball check valves prevent reverse flow through the vent when pilot pressure is applied to spools. Performance data is given in Figures 11, 12 and 13.

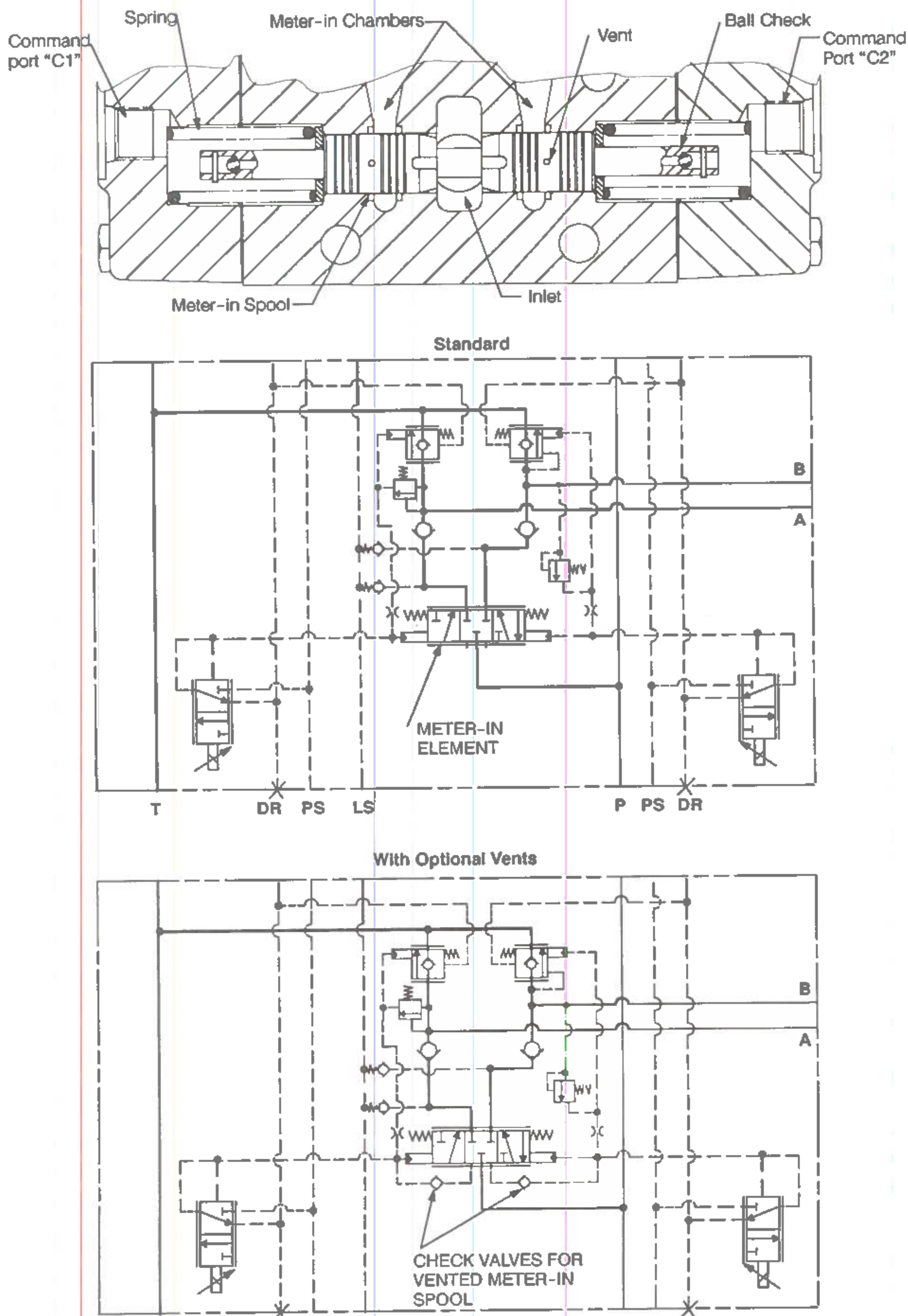

Command port "C1"
Spring
Meter-in Chambers
Vent
Ball Check
Command Port "C2"
Meter-in Spool
Inlet
Standard
B
A
METER-IN ELEMENT
T
DR
PS
LS
P
PS
DR
With Optional Vents
B
A
CHECK VALVES FOR VENTED METER-IN SPOOL
T
DR
PS
LS
P
PS
DR

Figure 10

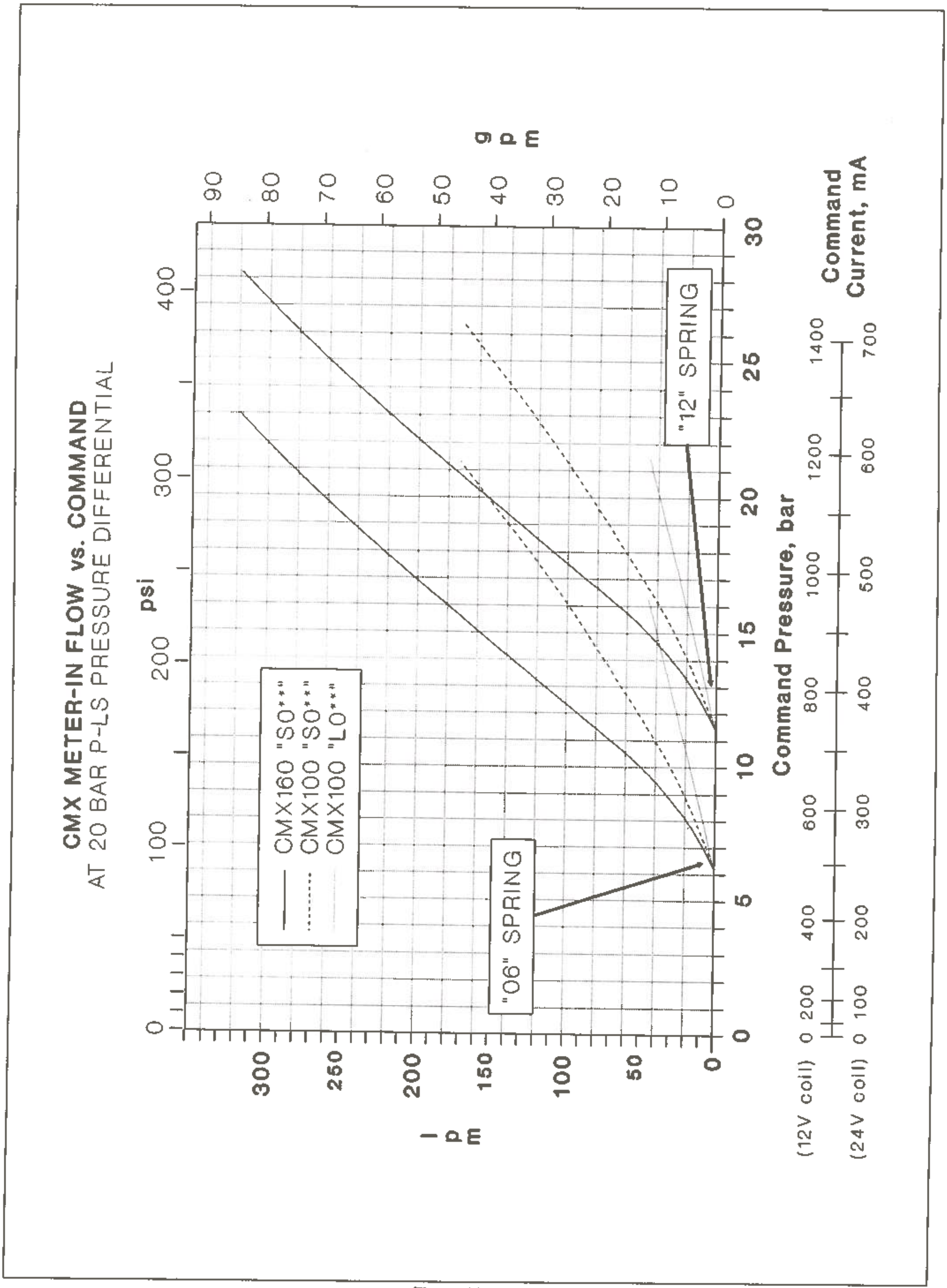

CMX METER-IN FLOW vs. COMMAND
AT 20 BAR P-LS PRESSURE DIFFERENTIAL
psi
0
100
200
300
400
g
p
m
0
10
20
30
40
50
60
70
80
90
l
p
m
0
50
100
150
200
250
300
CMX160 "S0**"
CMX100 "S0**"
CMX100 "L0**"
"06" SPRING
"12" SPRING
0
5
10
15
20
25
30
Command Pressure, bar
(12V coil) 0 200 400 600 800 1000 1200 1400
(24V coil) 0 100 200 300 400 500 600 700
Command
Current, mA

Figure 11

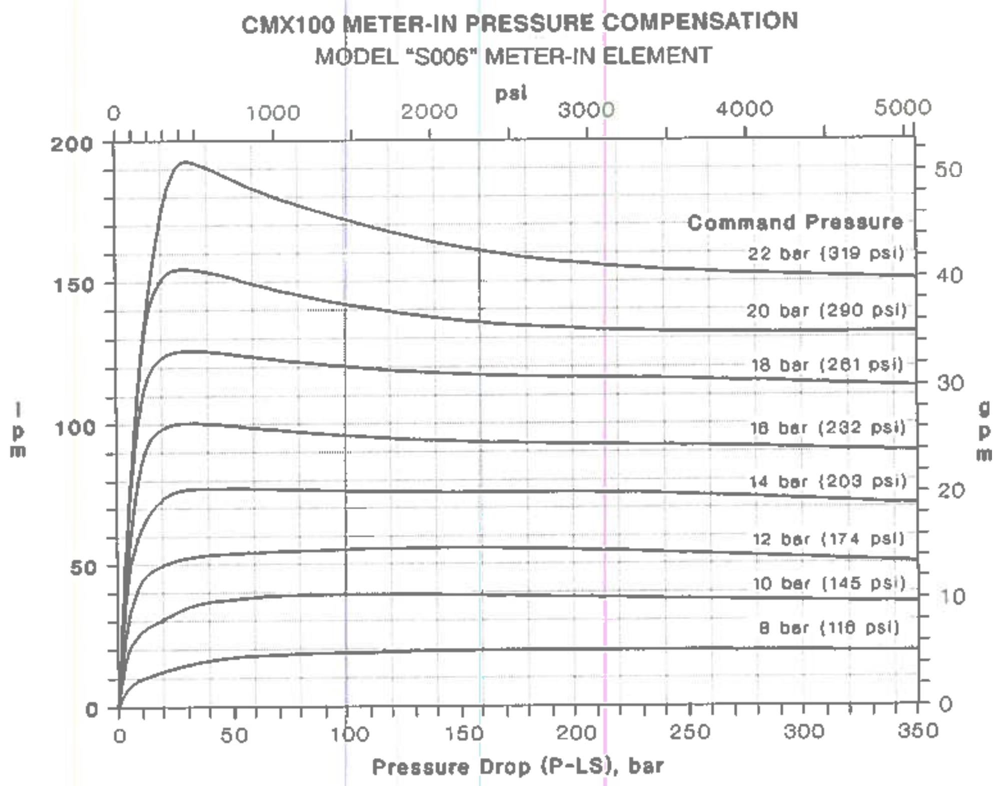


Figure 12a

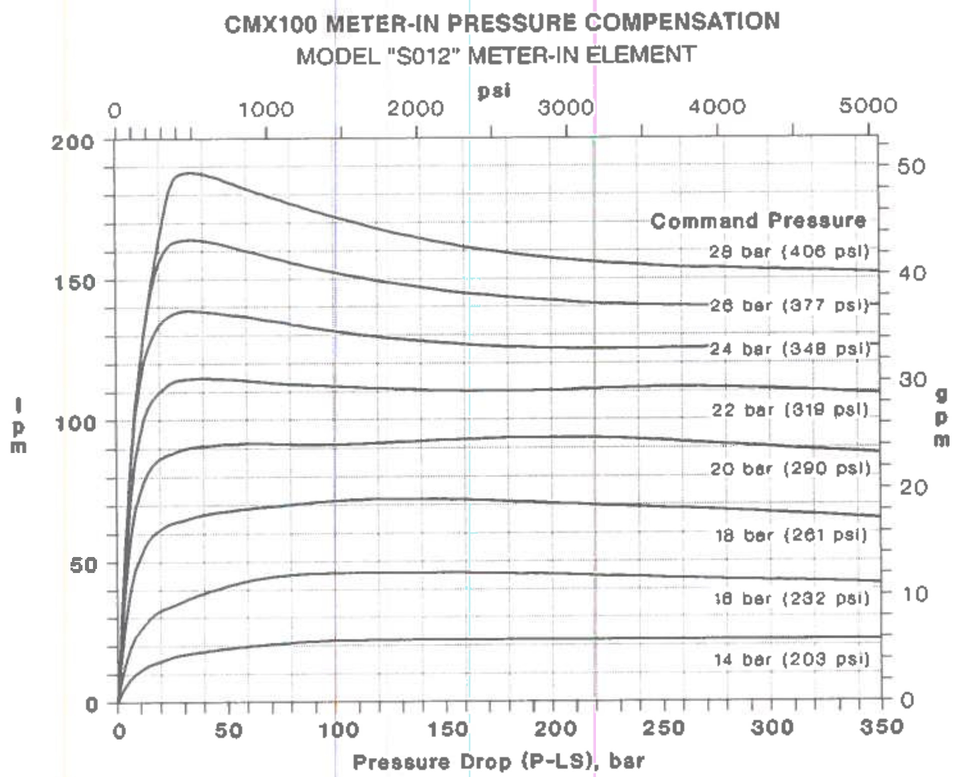


Figure 12b

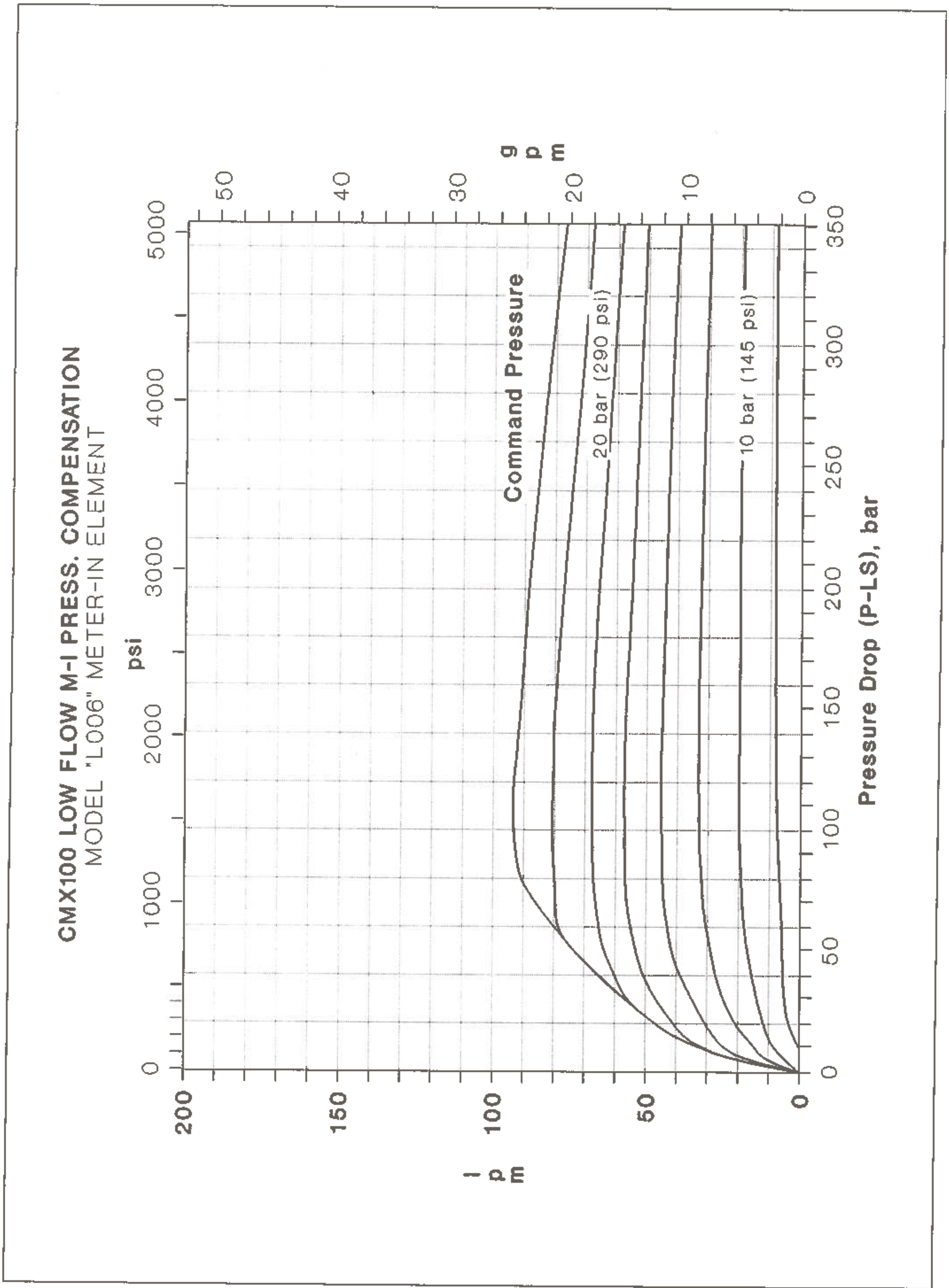

CMX100 LOW FLOW M-I PRESS. COMPENSATION
MODEL "L006" METER-IN ELEMENT
psi
0
1000
2000
3000
4000
5000
g
p
m
50
40
30
20
10
0
l
p
m
200
150
100
50
0
Command Pressure
20 bar (290 psi)
10 bar (145 psi)
0
50
100
150
200
250
300
350
Pressure Drop (P-LS), bar

Figure 12c

CMX160 METER-IN PRESSURE COMPENSATION
(FLOW FORCE COMPENSATION)
MODEL "S006" METER-IN ELEMENT

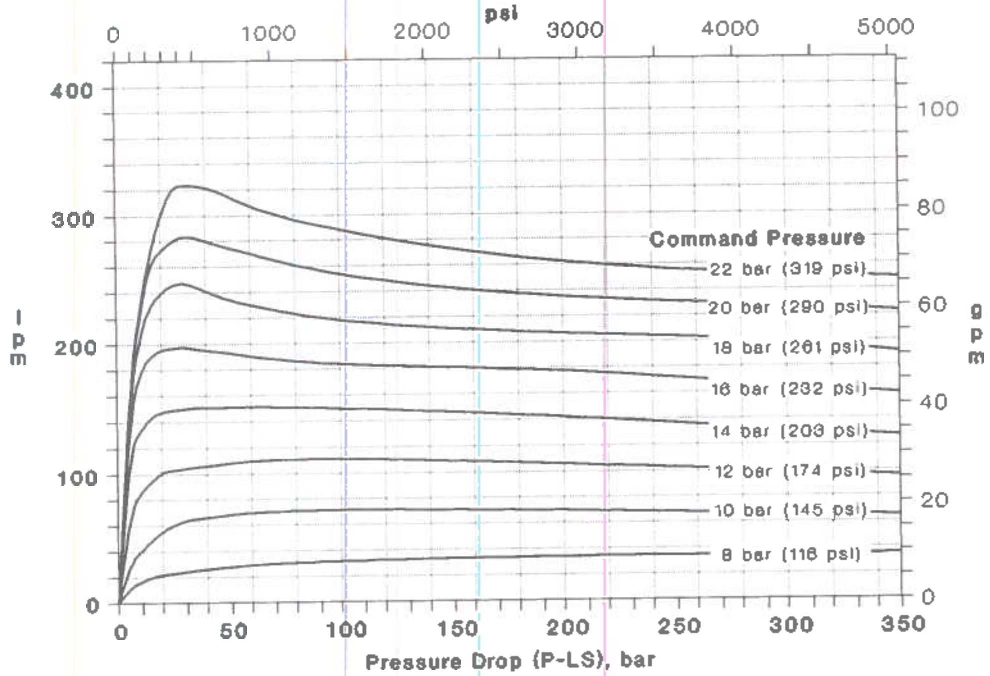


Figure 13a

CMX160 METER-IN PRESSURE COMPENSATION
(FLOW FORCE COMPENSATION)
MODEL "S012" METER-IN ELEMENT

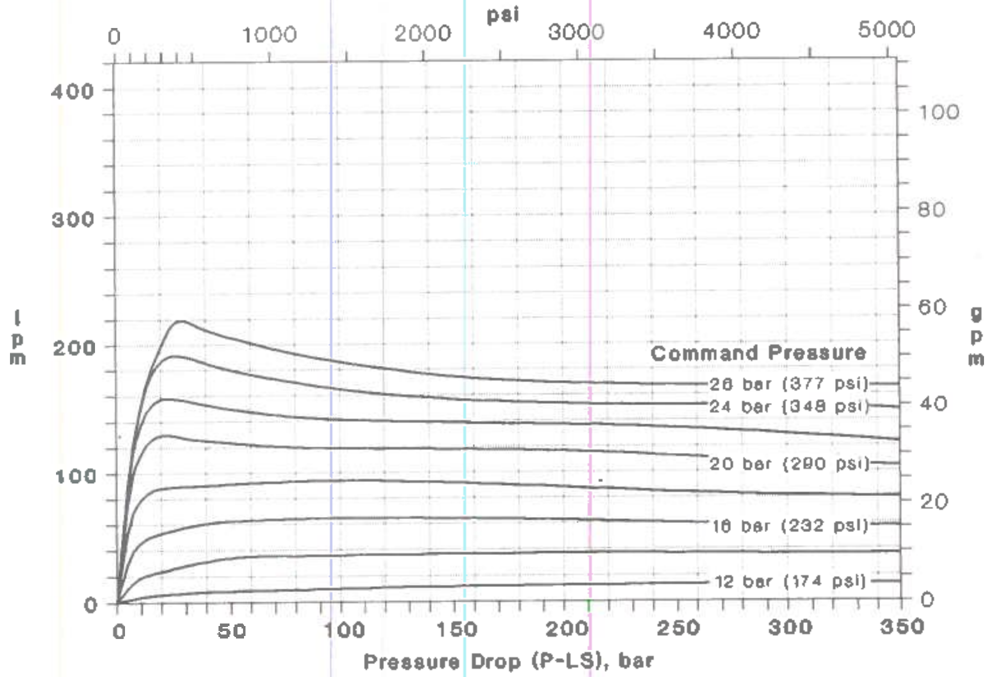


Figure 13b

Pressure control meter-in element "S***"

This element (Figure 14) is similar to the flow control element, except the pressure control spool has a feedback piston on each end. The meter-in chamber pressure acts on the area of the piston and opposes the pilot pressure opening the spool. The result is that, for a given input signal (pilot pressure), the flow decreases as the load pressure increases until the maximum pressure is reached at zero flow. By changing the input signal, the maximum load pressure can be changed.

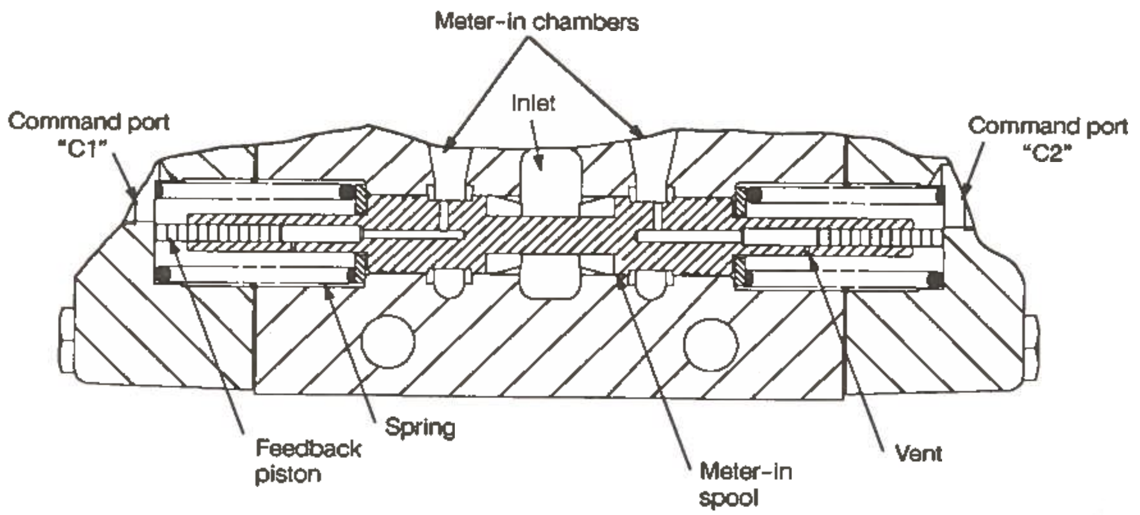
For a constant load pressure, changing the input signal will change the velocity of the load. This feature provides the operator with a good "feel" for the system by responding to changes in load pressure. For example, when driving a load at a given speed, if an obstacle is encountered, the load will slow or even stop. This response, which is typical of traditional open center bypass control valves, gives the operator better control of the system.

The pressure control spool also increases the system damping ratio, which affects system stability and response. By selecting the appropriate feedback piston size (diameter), the system damping ratio can be tailored to the application. Feedback piston diameters are given in the model code chart. The larger the feedback piston, the greater the increase in the damping ratio due to the pressure control spool.

The pressure-flow relationship is shown in the following Q-P diagrams (Figures 15 and 16). The slope of the constant-pilot-pressure lines is dependent on feedback piston diameter. The flow is independent of load pressure at zero load pressure, so a constant pilot pressure line will intercept the Q axis at the same point, regardless of its slope.

The meter-in chambers are drained by an orifice to the pilot pressure ports in a manner similar to the "S0**" flow control spool.

Different feedback piston sizes may be used for each end of the spool for different characteristics in each direction. A feedback pin may be used in one end only to provide pressure control in a single direction.



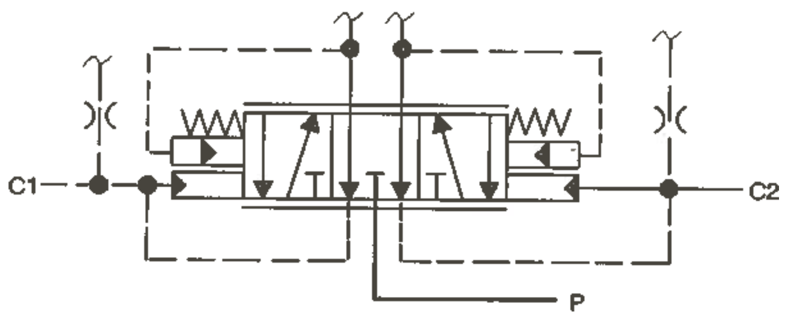


Figure 14

CMX100 METER-IN PRESSURE CONTROL SPOOL
Pressure vs. Flow
Model "S206" Meter-in Element

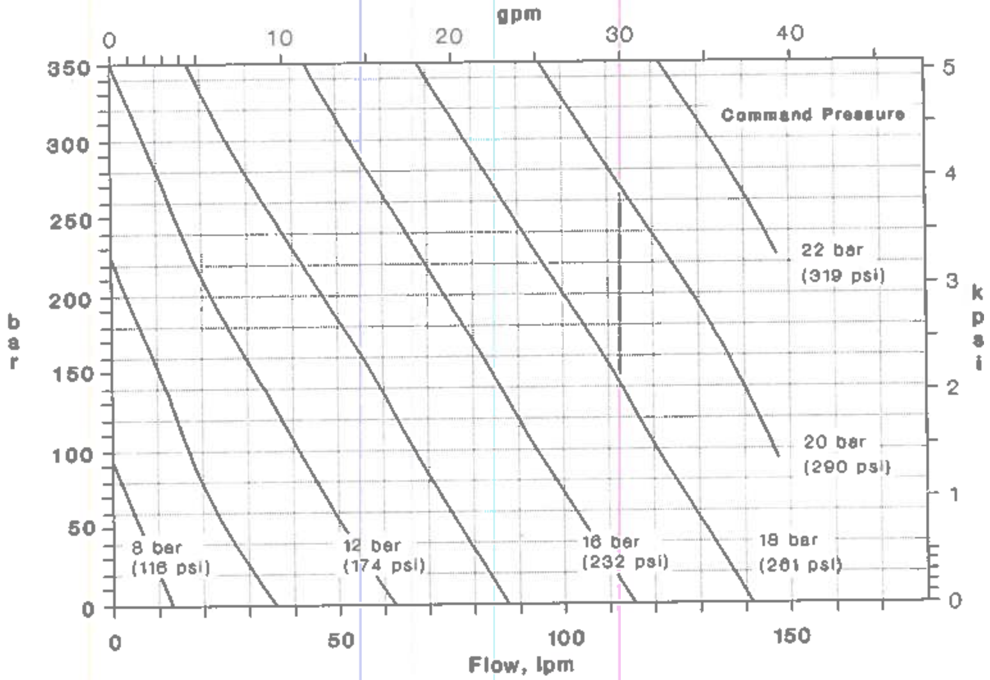


Figure 15a

CMX100 METER-IN PRESSURE CONTROL SPOOL
Pressure vs. Flow
Model "S406" Meter-in Element

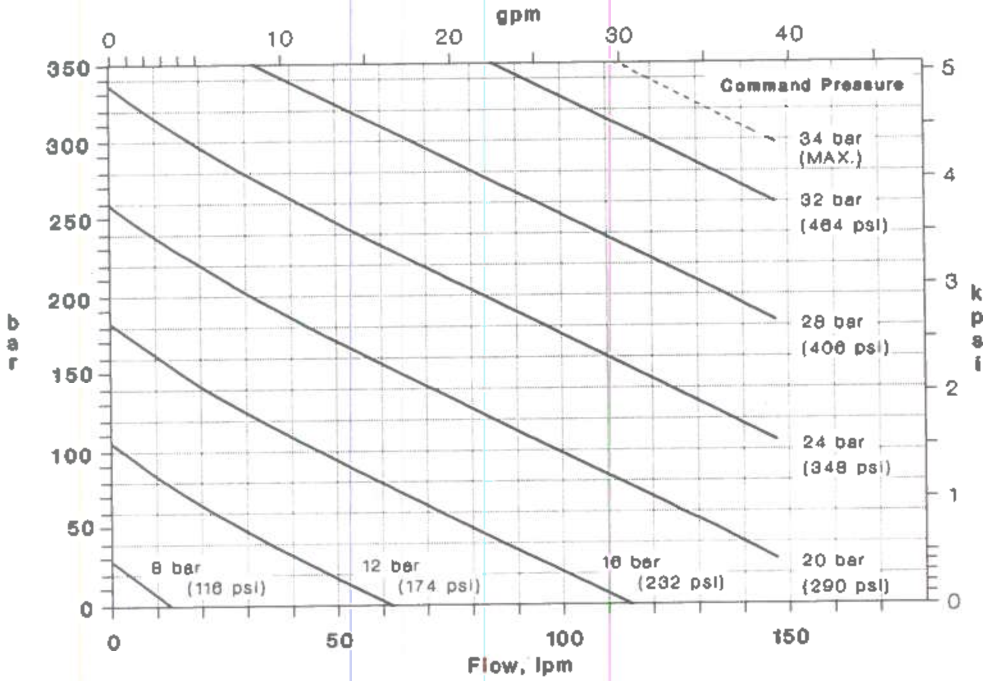


Figure 15b

CMX160 METER-IN PRESSURE CONTROL SPOOL
Pressure vs. Flow
Model "S206" Meter-in Element

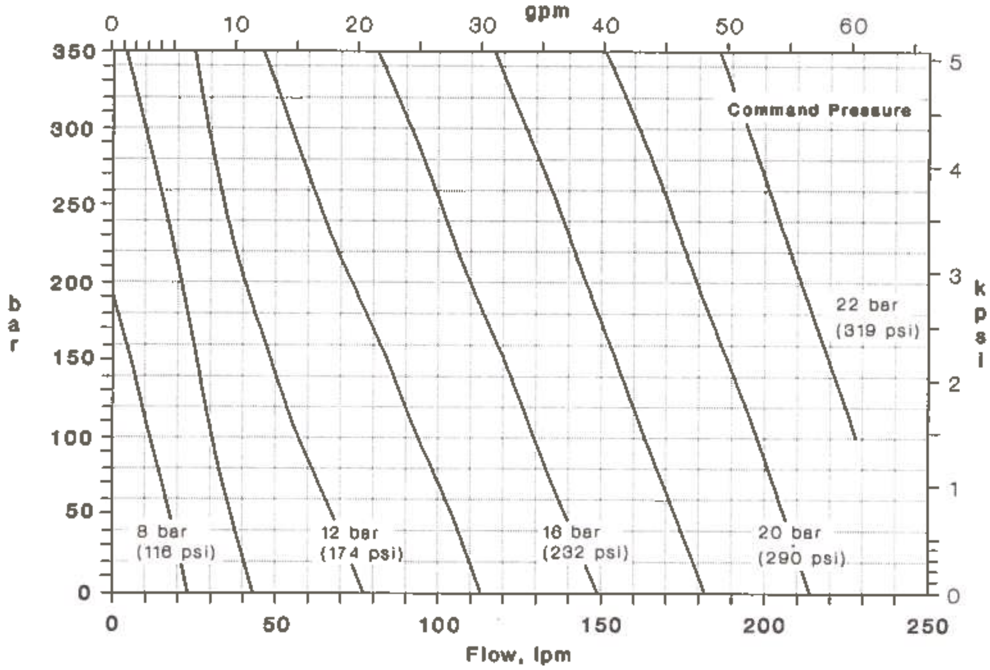


Figure 16a

CMX160 METER-IN PRESSURE CONTROL SPOOL
Pressure vs. Flow
Model "S406" Meter-in Element

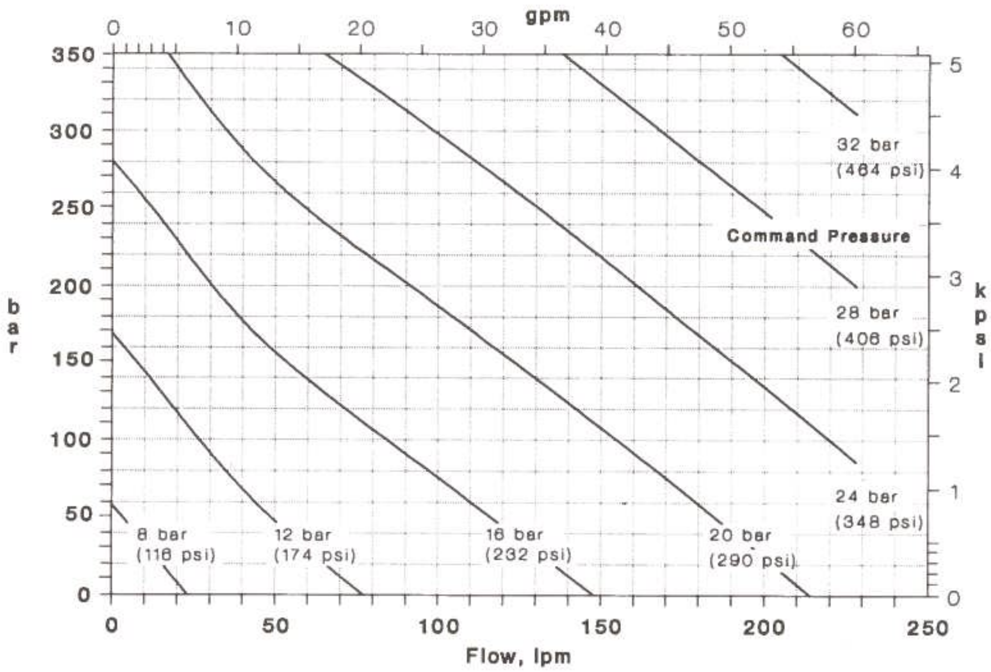


Figure 16b

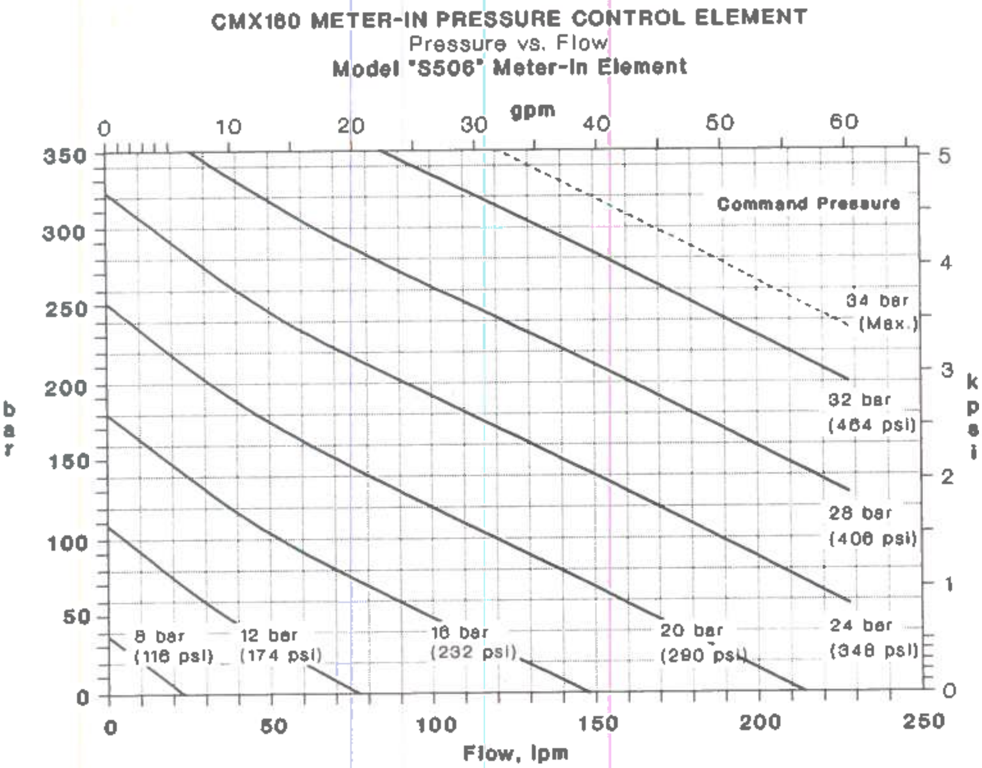

CMX160 METER-IN PRESSURE CONTROL ELEMENT
Pressure vs. Flow
Model "S506" Meter-In Element
gpm
0
10
20
30
40
50
60
350
300
250
200
150
100
50
0
bar
5
4
3
2
1
0
kpsi
Command Pressure
34 bar
(Max.)
32 bar
(464 psi)
28 bar
(406 psi)
24 bar
(348 psi)
20 bar
(290 psi)
16 bar
(232 psi)
12 bar
(174 psi)
8 bar
(116 psi)
0
50
100
150
200
250
Flow, lpm

Figure 16c

"S***" spool pressure compensation

The pressure control spool is pressure compensated by flow forces to provide constant flow independent of supply pressure, to minimize function interference. Since the spool does respond to load pressure and the pressure compensation curve is not perfectly flat, changes in load pressure will cause slight changes in the pressure flow relationship, as shown below (Figure 17).

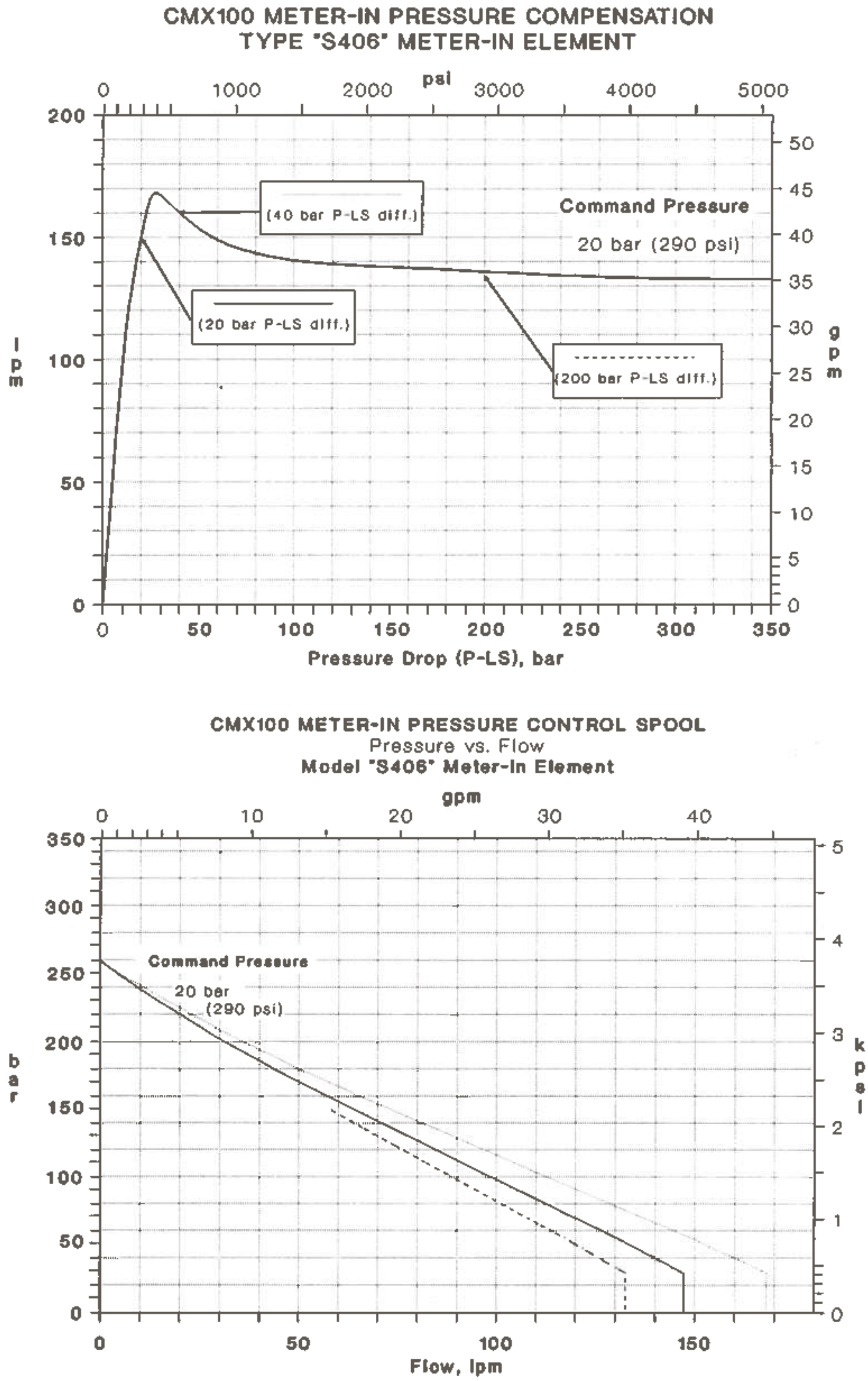


Figure 17

Flow limitation orifice

Flow to a work function can be limited by the installation of a restricting orifice in the pump supply port of the valve section. Since the orifice will restrict flow to all sections downstream, its use is normally limited to the last valve in a bank. The orifice is only effective if the limited flow function is the highest pressure function for the pump. The orifice reduces the pressure drop across the meter-in element, while the pump maintains a constant pressure differential between pressure and load sensing.

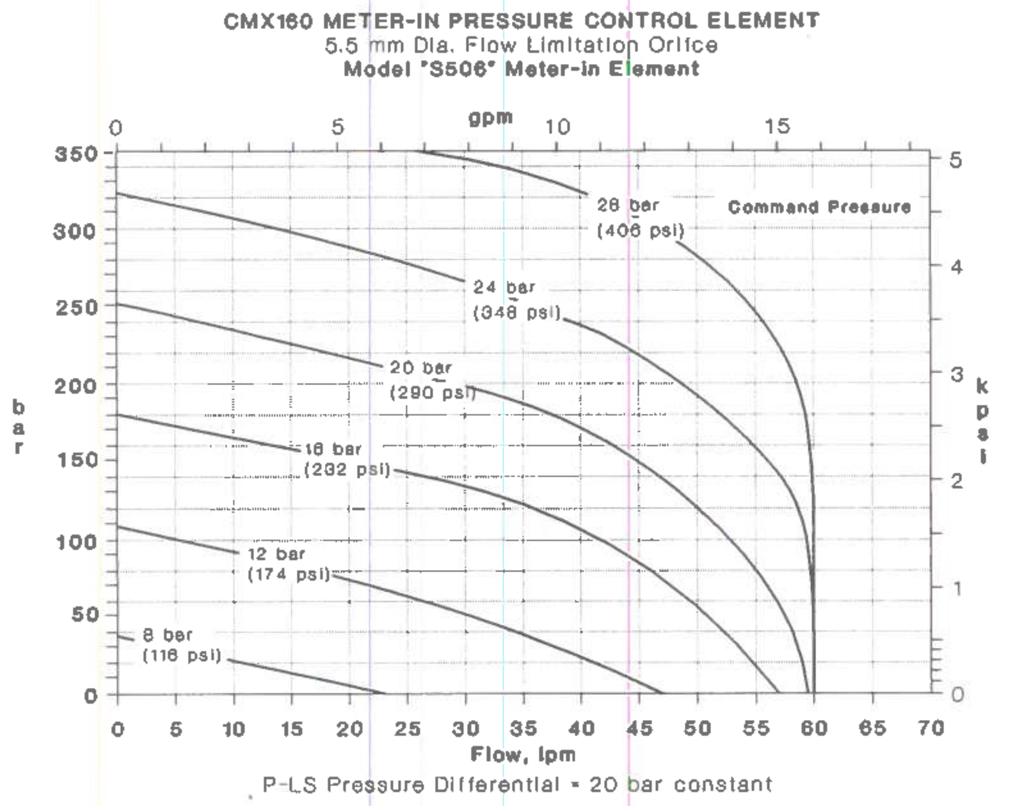


Figure 18a

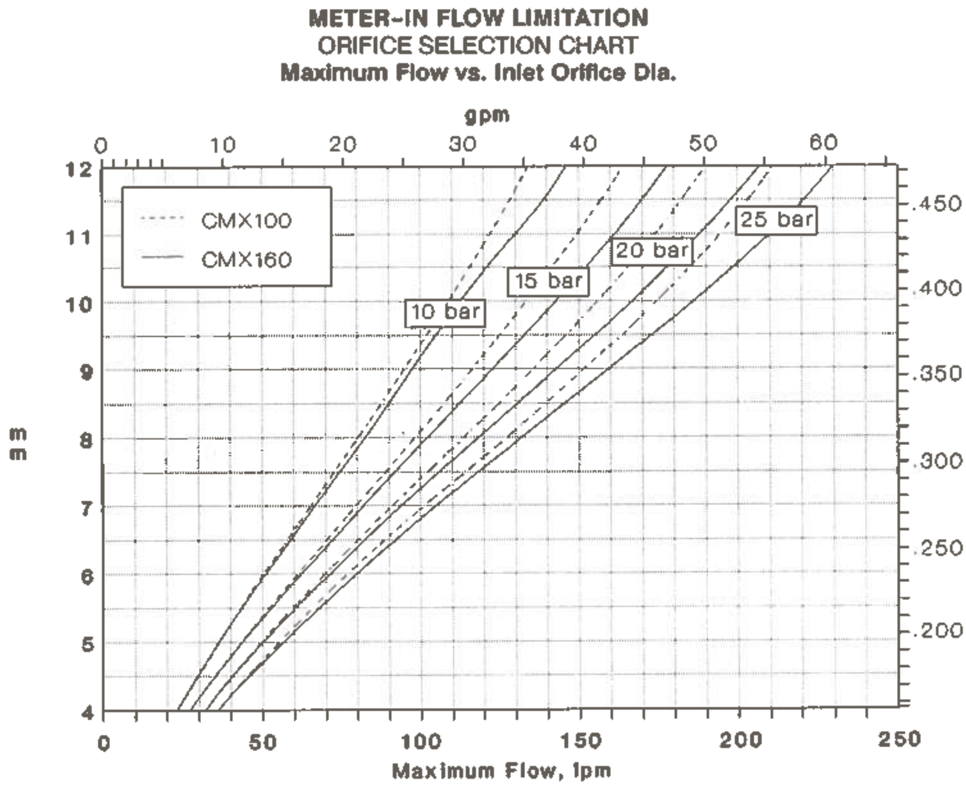


Figure 18b

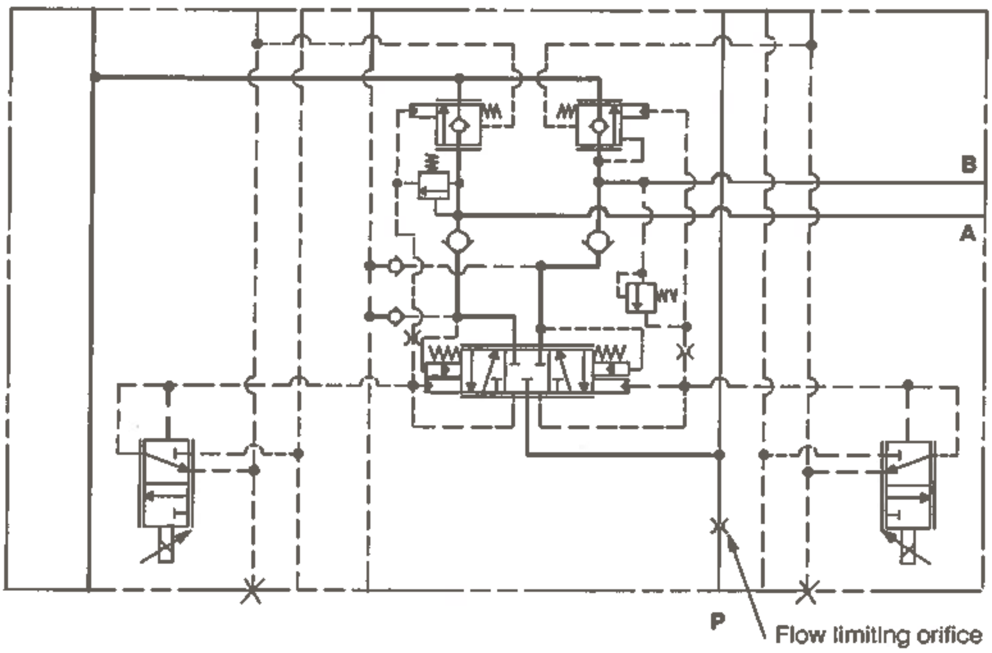


Figure 18c

Load sensing check valves – standard design

The -24 design CMX sectional valves are equipped with load sense check valves (Figure 19), that are different from the load sense shuttle valves provided on earlier models. The function of the load sense check valves is to supply the highest active load pressure to the load sense passage, while isolating lower pressure meter-in chambers from the load sense passage. The load drop check valves prevent the load pressure from overrunning loads or inactive (neutral) sections from reaching the meter-in chambers. When one or more of the sections in a valve bank is energized, the highest meter-in pressure is presented to the load sense port, which in turn controls the pump output pressure.

The load sensing pumps supplied by Vickers normally produce an output pressure between 13.8 bar (200 psi) and 41.4 bar (600 psi) above the load sense pressure. When all the sections are centered (or whenever the meter-in load sense signal decreases), all the load sense check valves close, trapping fluid in the load sense passage. A provision to vent this trapped fluid must be provided to allow the load sense signal to decay and the pump output pressure to return to standby. Valve bank end covers are available with a provision to vent the load sense port to drain.

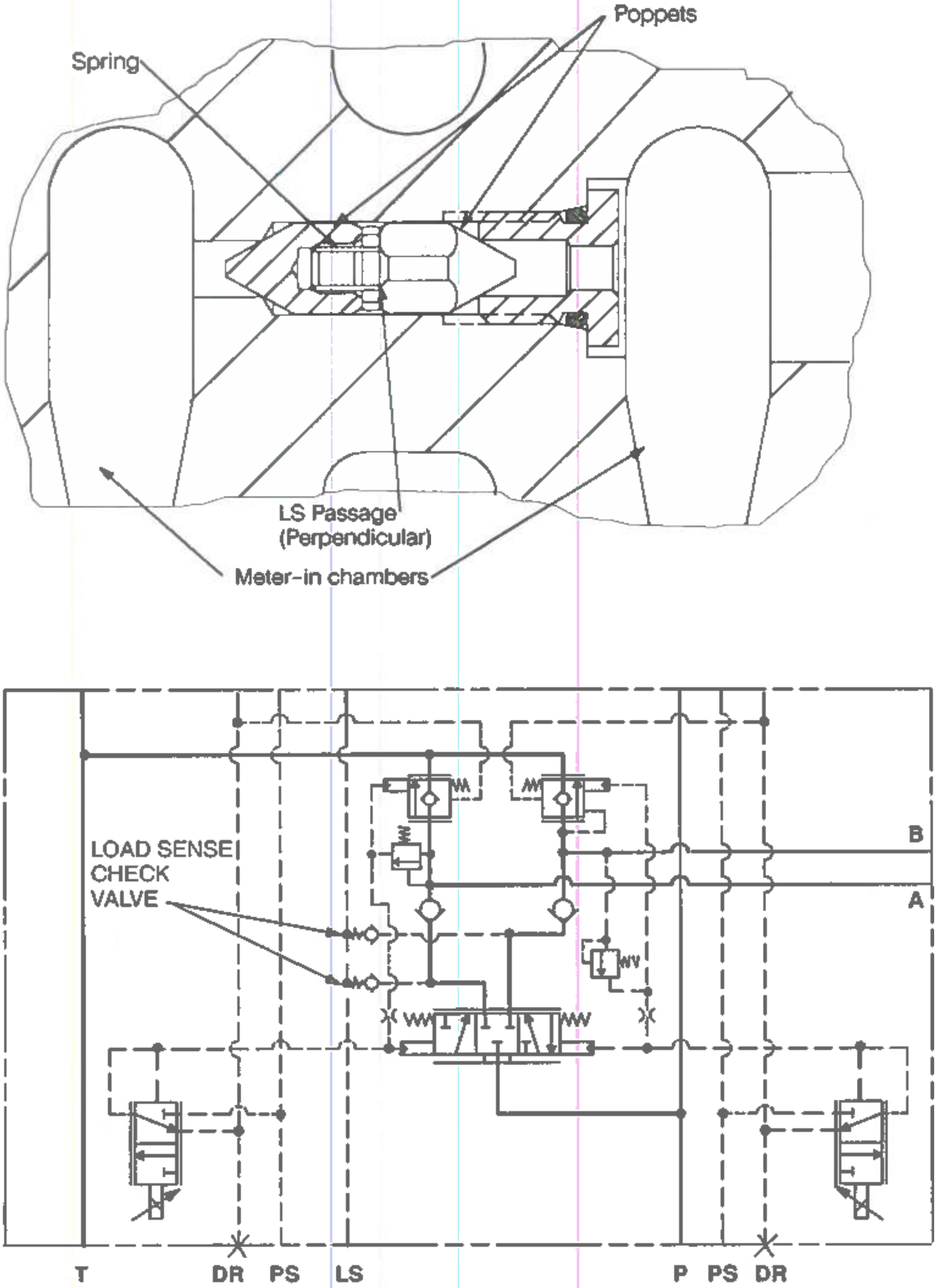


Figure 19

On systems which utilize the 0.5 mm bleed orifice, it is recommended for optimum performance that the orifice be located at the end of the valve bank opposite the pump connection. On multiple valve bank systems, the load sense connections should be made in series, with the orifice located as far from the pump as possible. On mid-inlet valve banks, the load sense-to-pump connection should be made at one end cover, and the bleed orifice located at the opposite end cover. The reasons for the above recommendations are as follows:

Flow in the load sense passage to the load sense bleed orifice causes a pressure drop through each section. The cumulative effect of the pressure drop through each section can be significant, especially at higher load sense pressures, higher fluid viscosities, and when many sections are present. The higher load sense pressures cause a higher bleed flow rate, and higher fluid viscosities (such as cold oil) cause a higher pressure drop. If the bleed flow is toward the pump load sense port (Figure 20b), the pressure drop subtracts from the load sense signal. For example, assume a 200 bar (2900 psi) load, and a pump load sense setting of 13.8 bar (200 psi). When the valve is energized, the 200 bar is presented to the load sense passage. If flow to the bleed orifice causes a pressure loss of 0.7 bar (10 psi) per section, and there are eight sections between the valve and the pump, then the pump will sense a load sense signal of 194.4 bar (2820 psi), and maintain an output pressure of 194.4 + 13.8 = 208.2 bar, which is only 8.2 bar (119 psi) above the load pressure. The result will be slower operation for that function. If the bleed flow is away from the pump load sense (Figure 20a), then the actual load sense pressure is supplied to the pump without flow induced pressure losses, and consistent performance can be achieved.

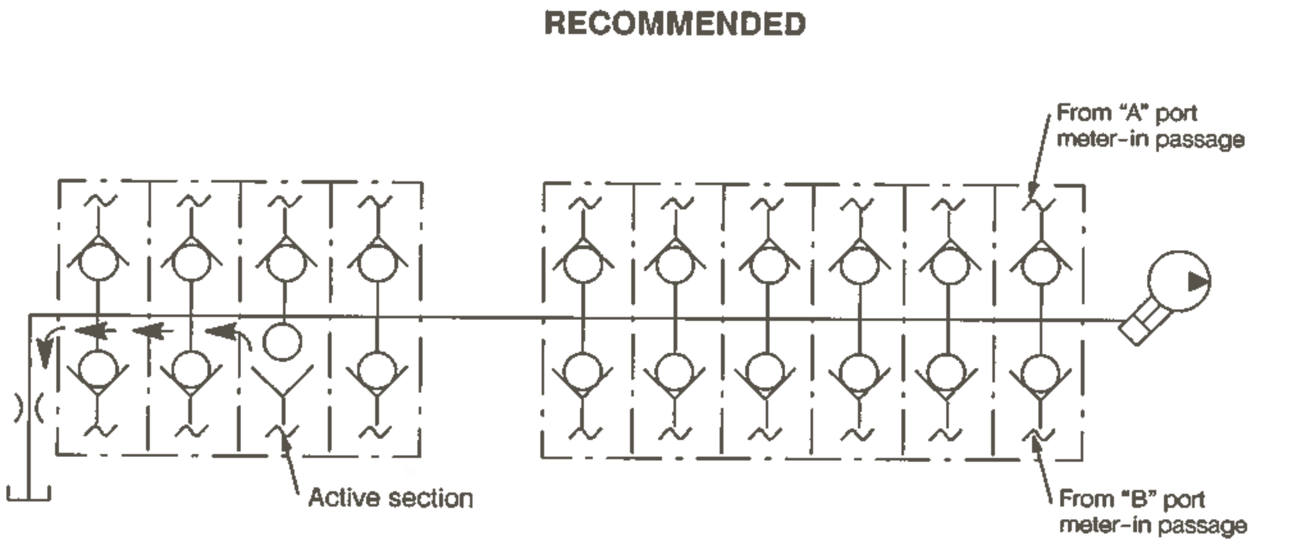


Figure 20a

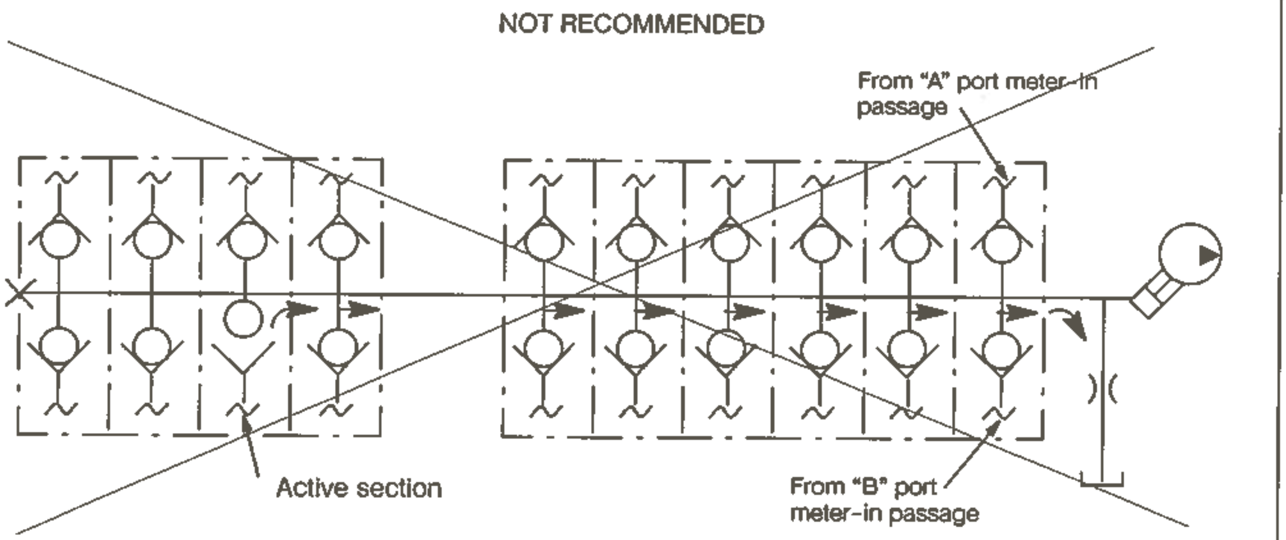


Figure 20b

Load drop check valves – standard

The load drop check valves (Figure 21) isolate the meter-in spool and the load sense check valves from the actuator ports. This feature makes it possible to maintain very low cylinder port leakage independent of meter-in spool-to-bore clearance. Therefore, meter-in spool-to-bore clearances are relatively large, minimizing hysteresis and making meter-in spools fully interchangeable.

Bleed orifice

Certain applications, such as brake release circuits and counterbalance circuits, require low actuator port pressure to be maintained in neutral. Load drop check valves with a bleed orifice are available to vent fluid trapped in the actuator ports to the meter-in chambers. This feature requires a meter-in element with drain orifices.

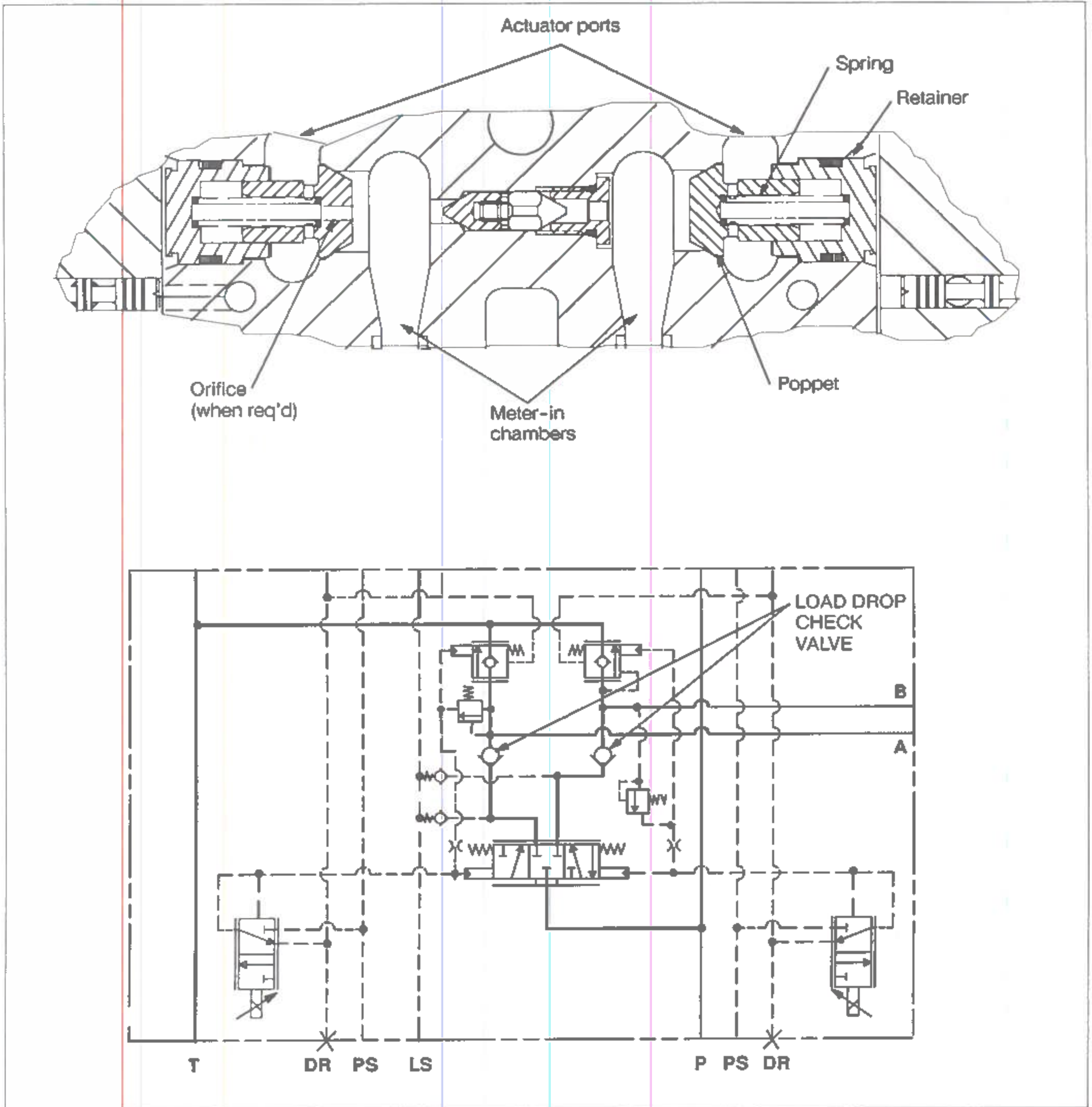


Figure 21

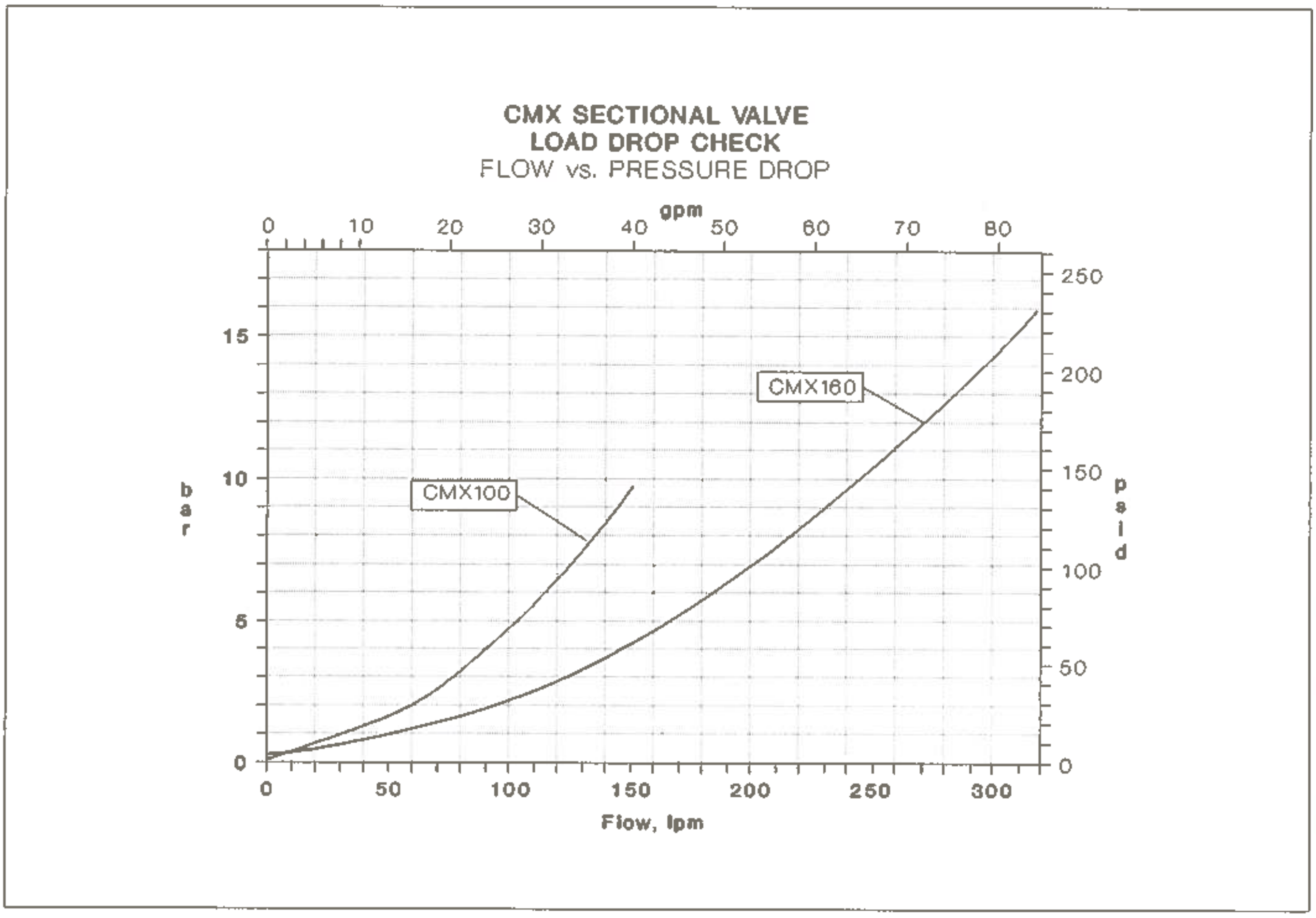

CMX SECTIONAL VALVE
LOAD DROP CHECK
FLOW vs. PRESSURE DROP
gpm
0
10
20
30
40
50
60
70
80
bar
15
10
5
0
psid
250
200
150
100
50
0
CMX160
CMX100
0
50
100
150
200
250
300
Flow, lpm

Figure 22

Meter-out elements

Meter-out control is achieved by using a pilot poppet-stem along with a modulating meter-out poppet to form a simple hydromechanical bleed servo (Figure 23). Actuator port pressure acts on the annular differential area between the major outside diameter of the meter-out poppet and the meter-out poppet skirt (or seat) diameter, and tends to push the meter-out poppet open. The pressure in the spring chamber acts on the full major O.D. area of the meter-out poppet, and tends to close the meter-out poppet. When the meter-out element is closed, the pressure in the spring chamber is equalized to actuator port pressure via a 0.75 mm (.030 in.) orifice in the meter-out poppet. Since the pressure in the spring chamber is only partially offset by the actuator port pressure acting on the annular area, the meter-out poppet remains closed provided tank pressure is below actuator port pressure.

To open the meter-out poppet, pilot pressure applied to the meter-in spring chamber is transmitted by a passage in the control cap gasket to the meter-out piston. The force against the meter-out piston moves the poppet-stem from its seat and against the opposing spring, opening a passage from the meter-out spring chamber to the tank passage. Fluid then passes from the actuator port through the orifice in the meter-out poppet to the spring chamber and then to tank. This flow develops a pressure differential across the orifice in the meter-out poppet, which subtracts from the actuator port pressure, reducing the meter-out spring chamber pressure. When the pressure in the meter-out spring chamber falls low enough, the actuator port pressure acting on the annular area will overcome the meter-out spring chamber pressure and open the meter-out poppet, moving it toward the poppet stem. This motion will tend to close the poppet-stem against its seat, reducing the flow-induced pressure drop across the orifice and increasing the pressure in the meter-out spring chamber.

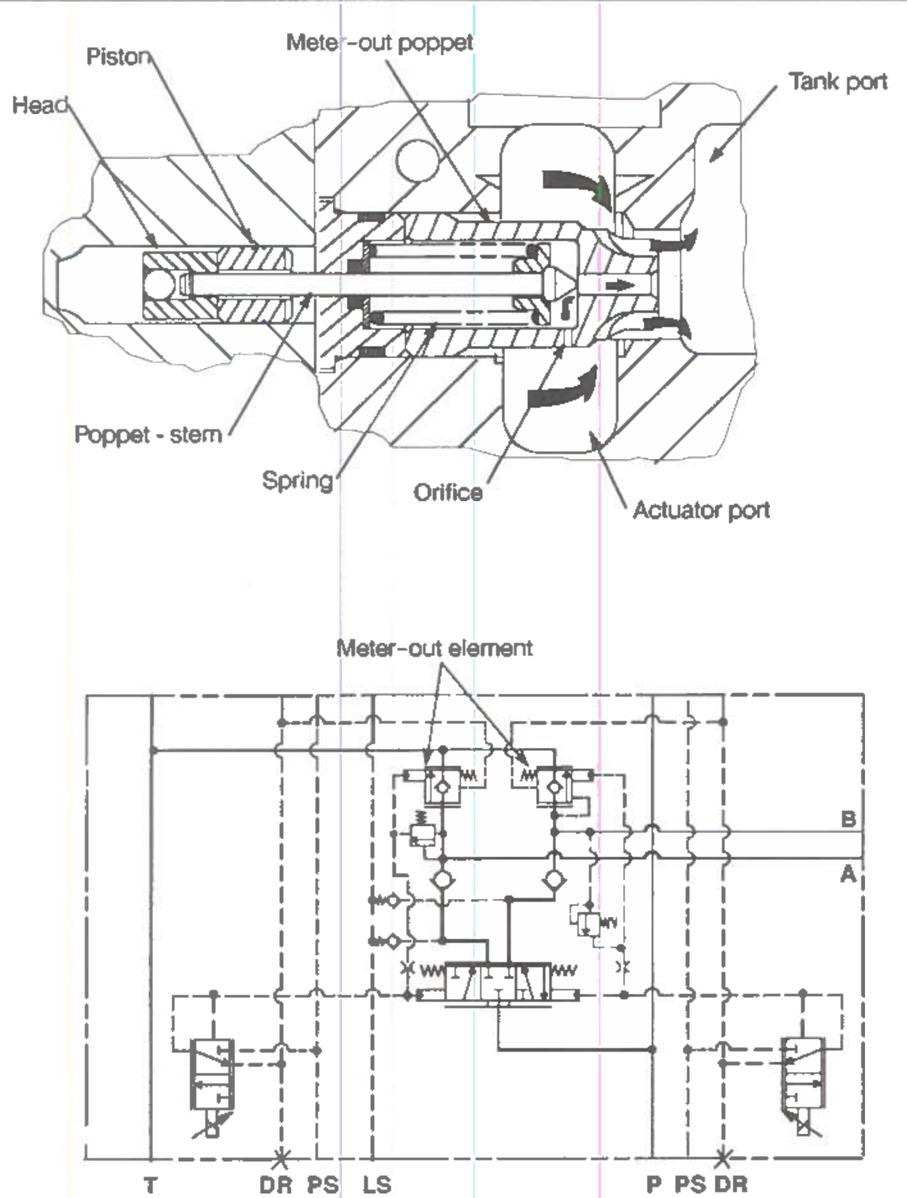


Figure 23. The meter-out element is not pressure compensated, so interaction problems with the meter-in element are avoided.

The meter-out poppet will assume a position where the poppet stem to-seat restriction is such that the reduced pressure in the meter-out spring chamber balances the forces on the meter-out poppet. The net effect is that the meter-out poppet follows the poppet-stem position. The movement of the poppet-stem is controlled only by the pilot signal and the spring it moves against. The position feedback gain of the meter-out poppet is high, so a small change in position of the meter-out poppet away from the balanced-force position results in a large increase in forces acting to return the meter-out poppet to the balanced-force position. These forces are high compared to flow forces, so the meter-out poppet will not close prematurely due to flow forces.

Several different meter-out poppets are available which provide different area gains. A high gain poppet (low ΔP at rated flow) provides better control when lowering a light load. A low gain poppet (high ΔP at rated flow) provides better control when lowering heavy loads.

Meter-out poppets are rated according to the actuator port to tank pressure drop in bar across the poppet at the valve's rated flow with the poppet fully opened. Performance data is given in Figures 24 and 25.

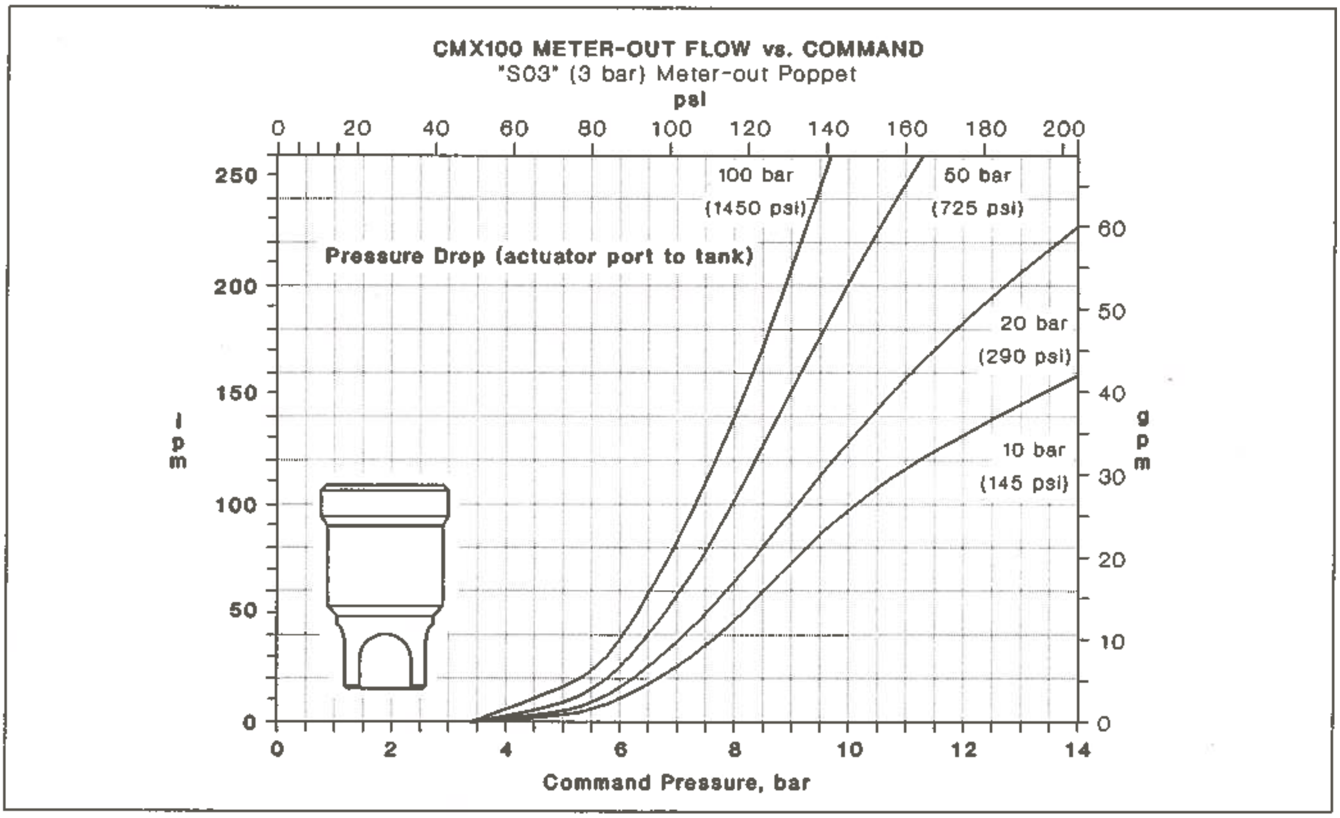


Figure 24a

CMX100 METER-OUT FLOW vs. COMMAND
"S14" (14 bar) Meter-out Poppet

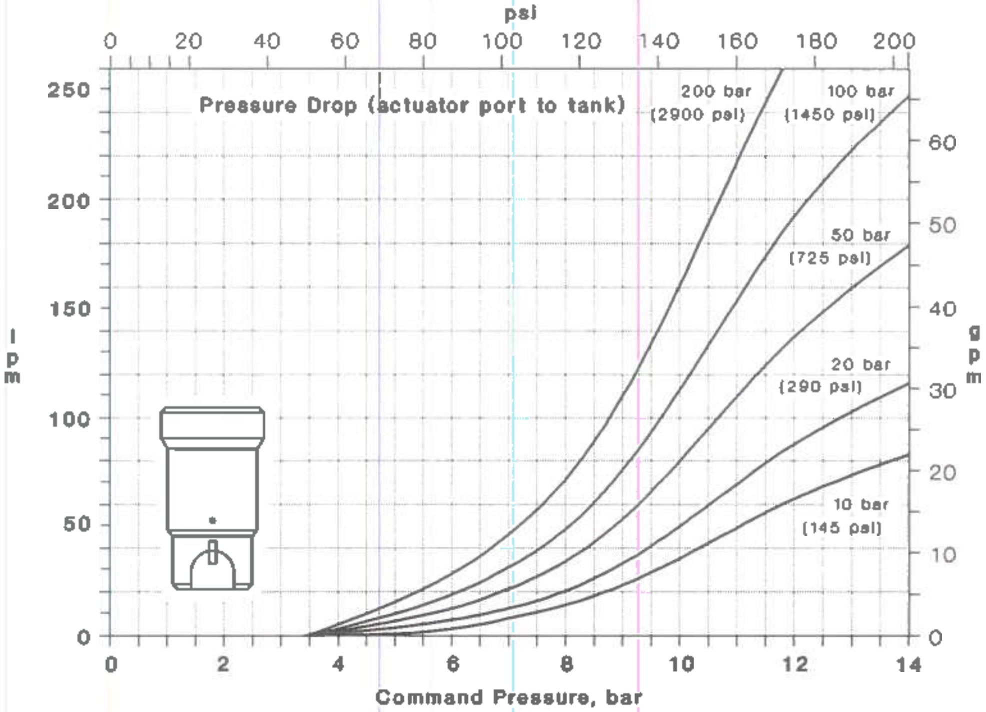


Figure 24b

CMX100 METER-OUT FLOW vs. COMMAND
"S90" (90 bar) Meter-out Poppet

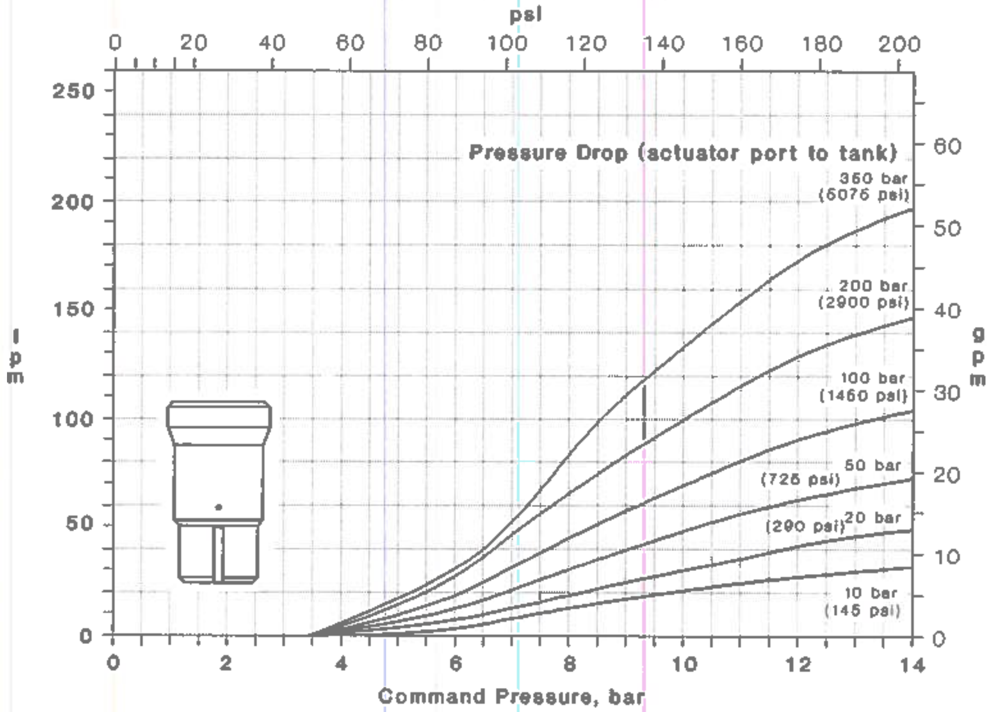


Figure 24c

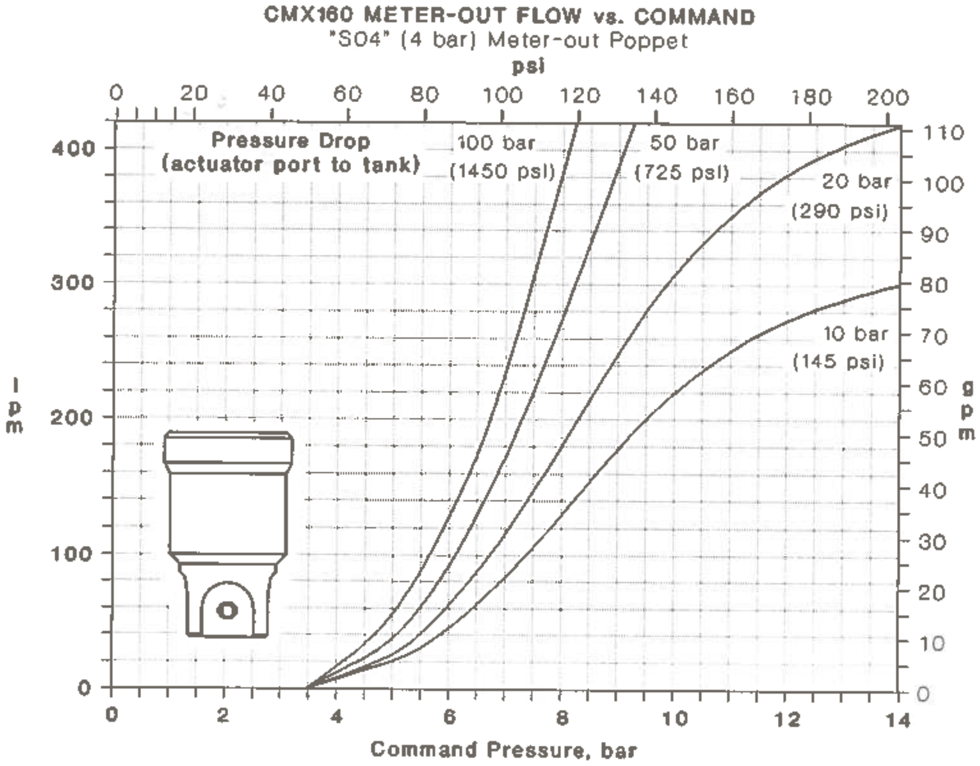


Figure 25a

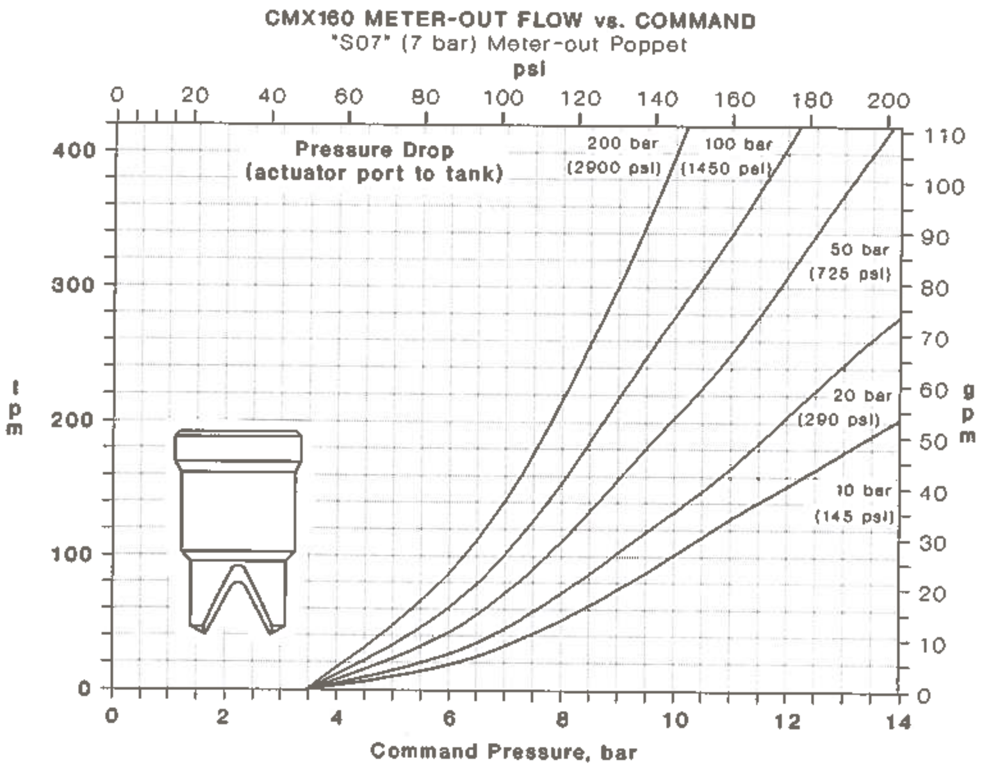


Figure 25b

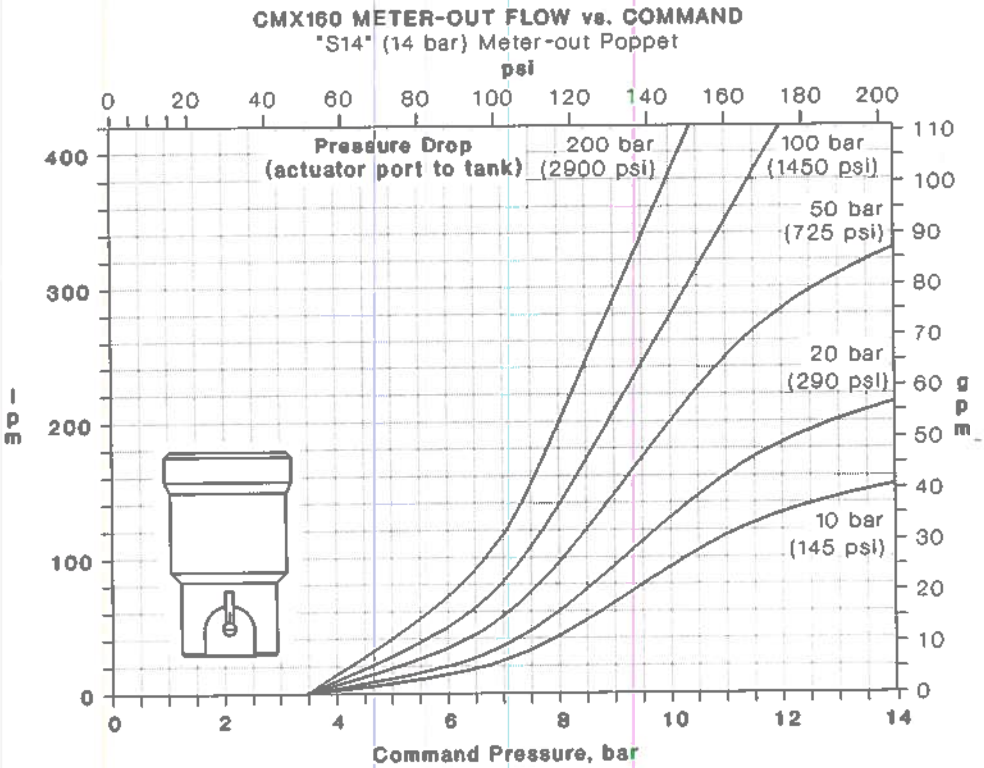


Figure 25c

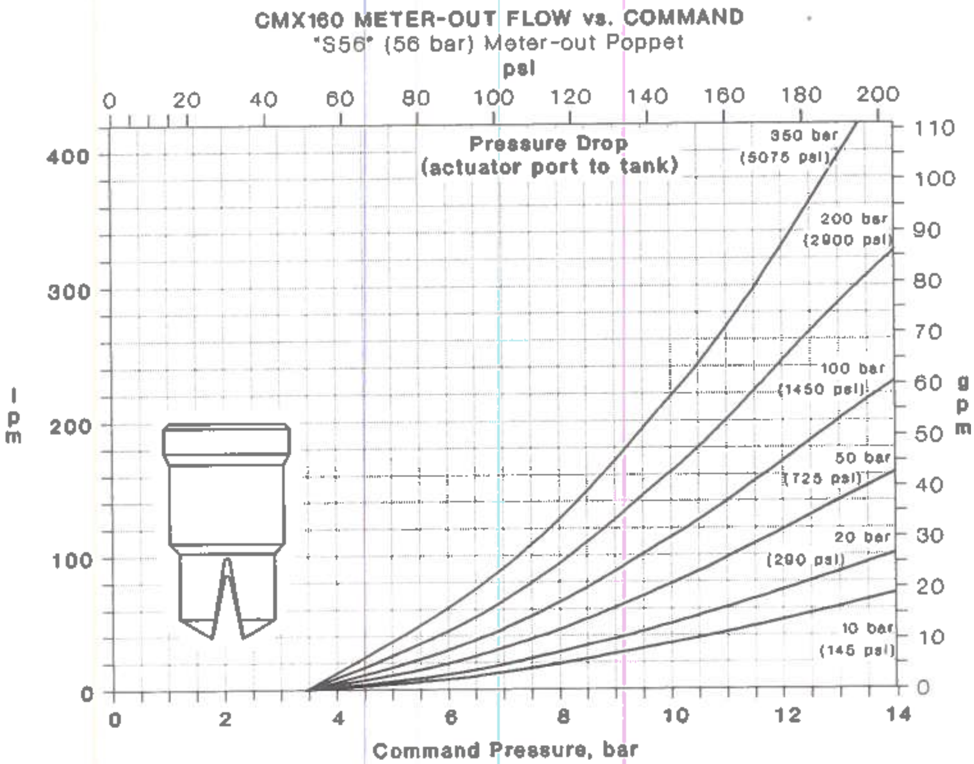


Figure 25d

Anticavitation check valves – standard

Cavitation protection is normally provided by reverse flow through the meter-out poppets. In this mode, tank pressure above the actuator port pressure, acting on the meter-out poppet skirt area, opens the meter-out poppet. Tank pressure is maintained by a back pressure check in the tank line. Performance (flow vs. pressure drop) is shown on the diagrams below (Figure 26).

For meter-out load pressures above 70 bar sufficient momentum exchange occurs, due to the high velocity jet from an actuator port exhausting fluid impinging upon the opposite meter-out poppet, to cause the opposite actuator port pressure to be higher than the tank pressure. This phenomenon is fairly complex, since the opposite port pressure is a function of the load pressure, load speed (or flow rate), the tank port pressure, the area gains of both meter-out poppets (poppet types) and the cylinder area ratio.

The following example is illustrative: for a CMX160 lowering A to T a load of 138 bar (2000 psi), 160 lpm (42 USgpm), 1:1 area ratio, open tank (no back pressure check valve), a type "56" meter-out poppet in the A port, and a type "07" poppet in the "B" port; the "B" port pressure is 12.9 bar (187 psi) and the tank port pressure is 0.5 bar (7 psi). For the same conditions with a 2:1 area ratio, the "B" port pressure would be 7.6 bar (110 psi) and the tank pressure would be 0.7 bar (10 psi).

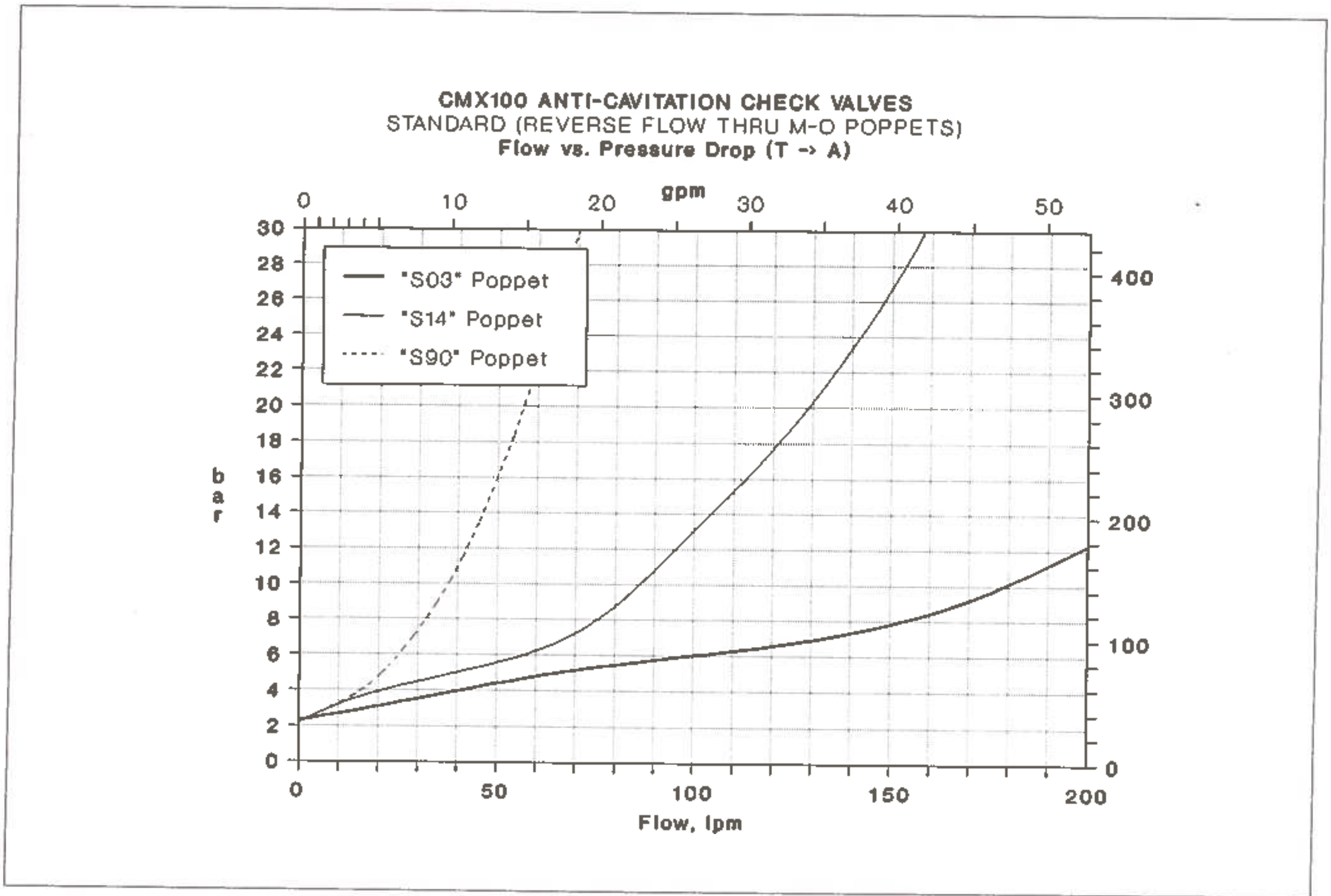


Figure 26a

CMX160 ANTICAVITATION CHECK VALVES

STANDARD (REVERSE FLOW THRU M-O POPPETS)

Flow vs. Pressure Drop (T -> A)

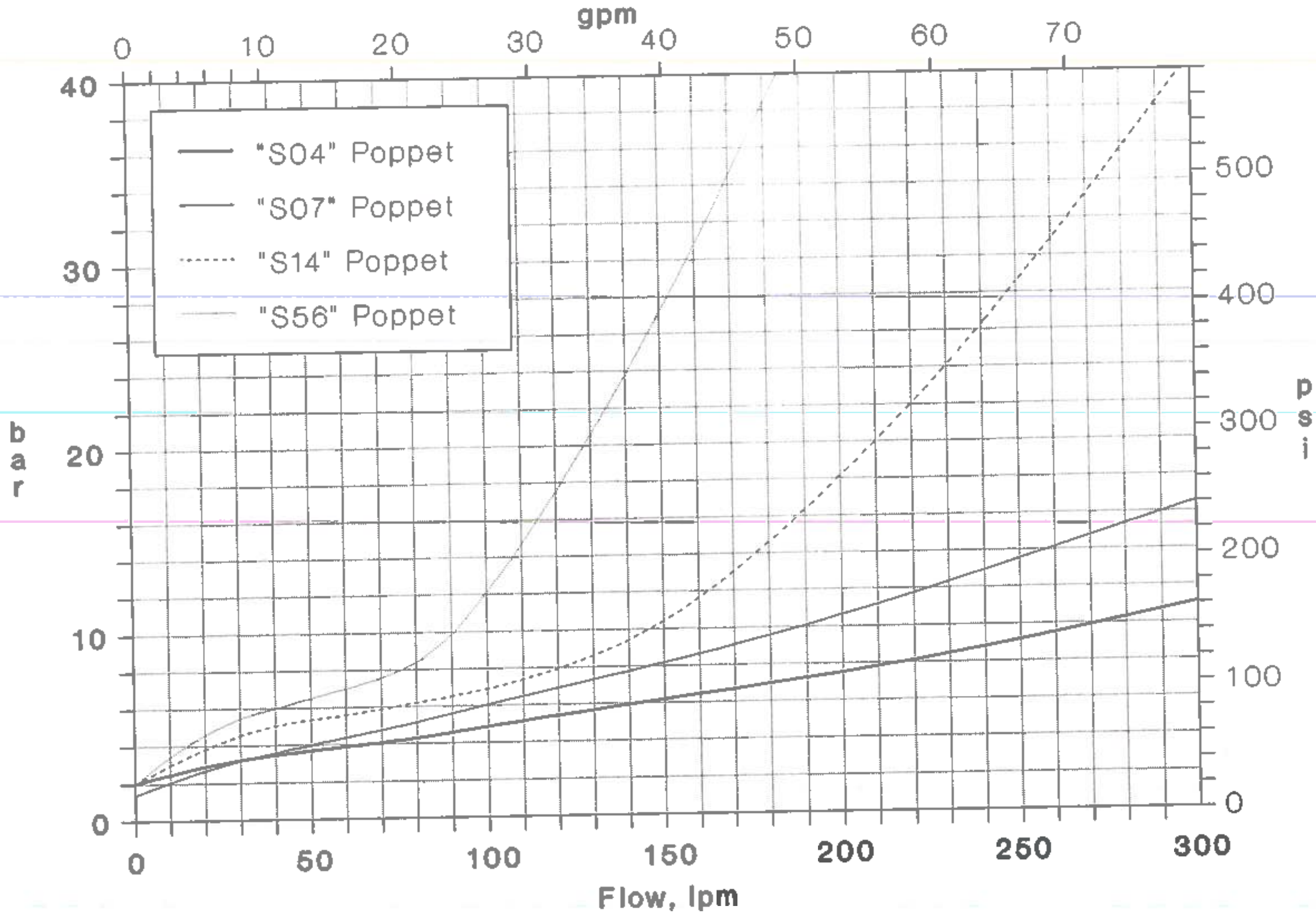


Figure 26b

The meter-out poppet will remain closed when the tank pressure is above the actuator port pressure and the meter-out servo is piloted open. In this case, the poppet-stem opens, and fluid enters the spring chamber from tank. The orifice in the meter-out poppet restricts the flow leaving the spring chamber, so the spring chamber pressure is nearly equal to the tank pressure. Since the actuator port pressure is lower than tank, the force on the annular area of the meter-out poppet due to actuator port pressure is less than the opposing force due to tank pressure in the spring chamber, and the meter-out poppet closes and remains closed. Cavitation can occur under these conditions, which normally occur only if the "float" feature (page 36) is used, or when reversing the direction of a moving load. Special meter-out poppets are available with check valves which prevent reverse flow into the meter-out spring chamber and subsequent uncontrolled closing of the meter-out poppet. (Not available for CMX160 "07" and "56" M-O poppets.)

Anticavitation module

For applications that require minimal back pressure in the tank port, a bolt-on module (Figure 27) is available that provides anticavitation performance superior to the meter-out poppet. This module is only available on models with the SAE 4-bolt flange. Modules are available with single and dual anti-cavitation check valves. Figure 28 shows typical performance data.

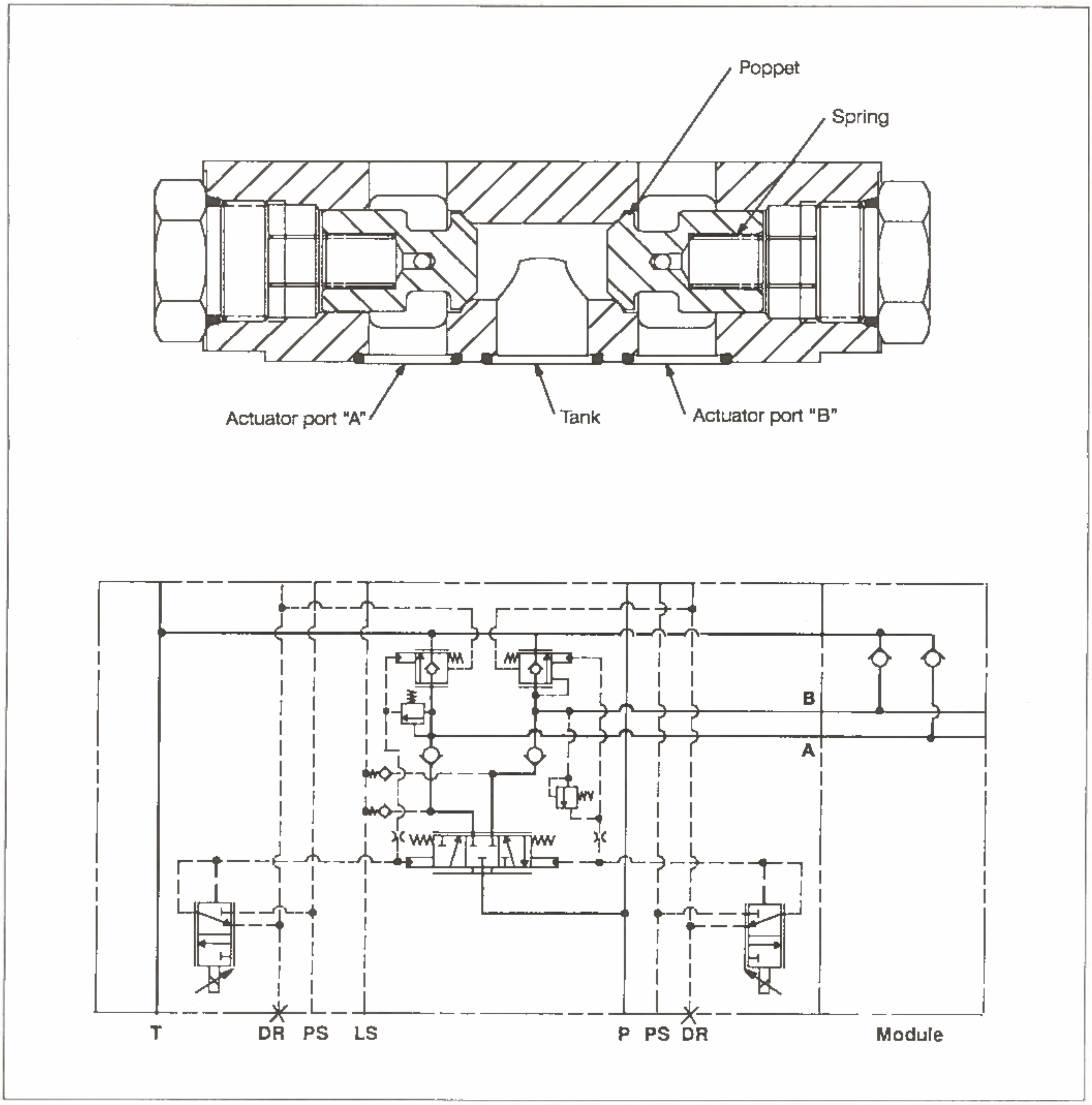


Figure 27

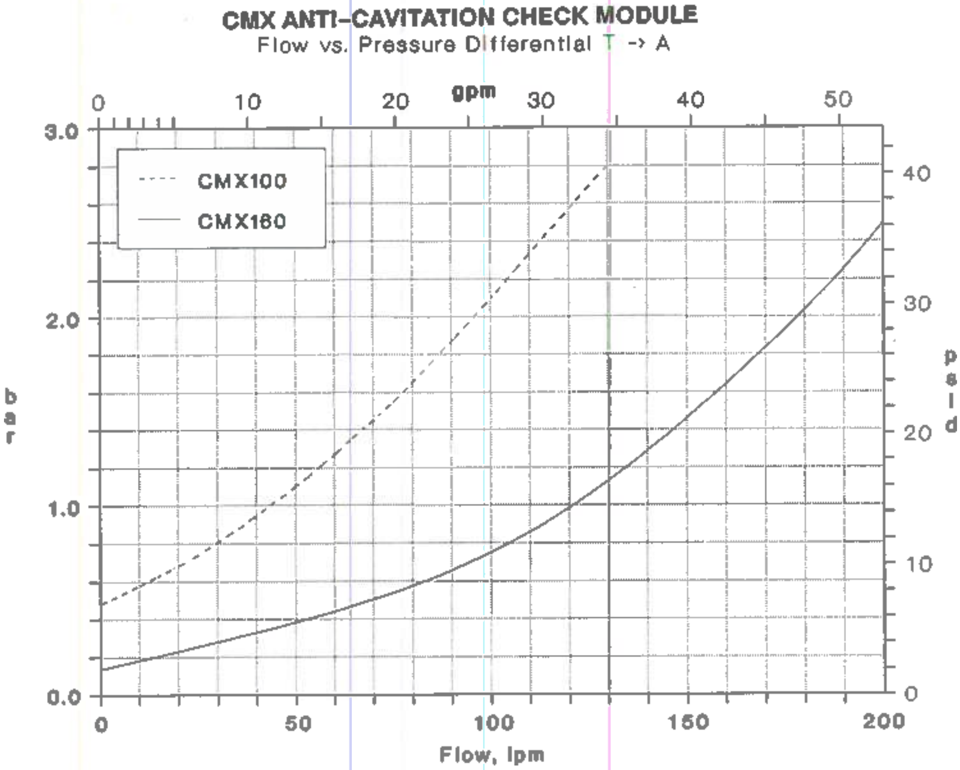


Figure 28

Float function

A feature inherent in the CMX valves is the float function capability which is similar to the fourth position float function on manual spool type mobile control valves. To activate the float function, both control ports are energized at the same time to the same pressure. This action pilots open both meter-out elements, while the meter-in spool remains centered due to the balanced pilot pressures. Pressure drop from actuator port to actuator port will depend on the meter-out poppet types employed and the cylinder area ratio.

To prevent cavitation caused by the uncommanded closing of the meter-out poppets as described on page 33, meter-out poppets with the reverse flow check valve or an anti-cavitation module should be used.

Figure 29 gives performance data for typical applications.

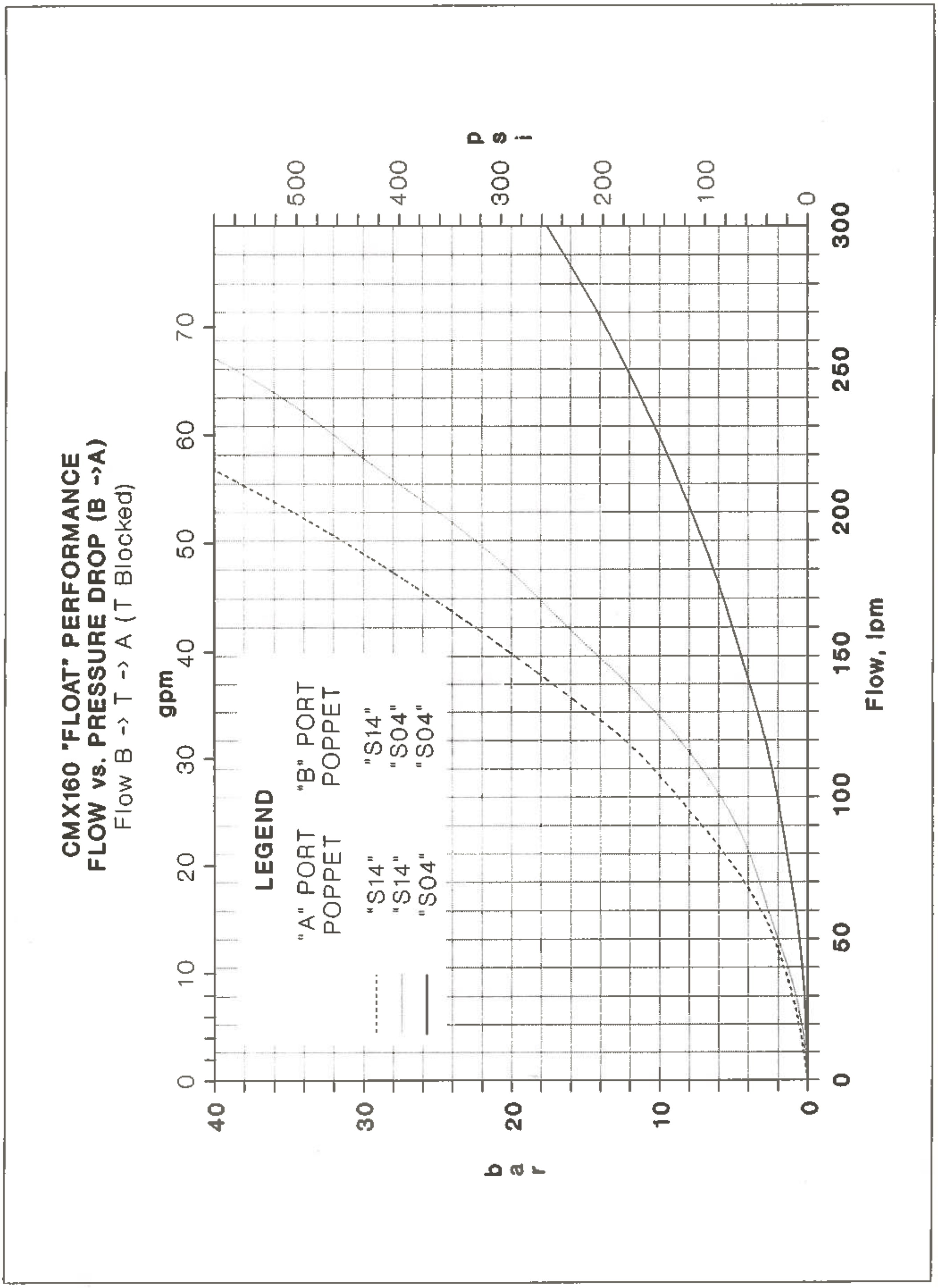

CMX160 "FLOAT" PERFORMANCE
FLOW vs. PRESSURE DROP (B ->A)
Flow B -> T -> A (T Blocked)
gpm
0
10
20
30
40
50
60
70
LEGEND
"A" PORT POPPET
"B" PORT POPPET
"S14"
"S14"
"S04"
"S14"
"S04"
"S04"
p s i
0
100
200
300
400
500
b a r
0
10
20
30
40
Flow, lpm
0
50
100
150
200
250
300

Figure 29

Meter-out spool

A version of the CMX that replaces the meter-out poppets with a spool is available. This version does not provide meter-out metering, load holding or relief valve protection. This version can be used with counterbalance valve circuits. Two meter-out spool versions are available; one is open in neutral, the other provides restricted flow to tank in neutral. The restriction is equivalent to a 0.75 mm (.030 in.) orifice.

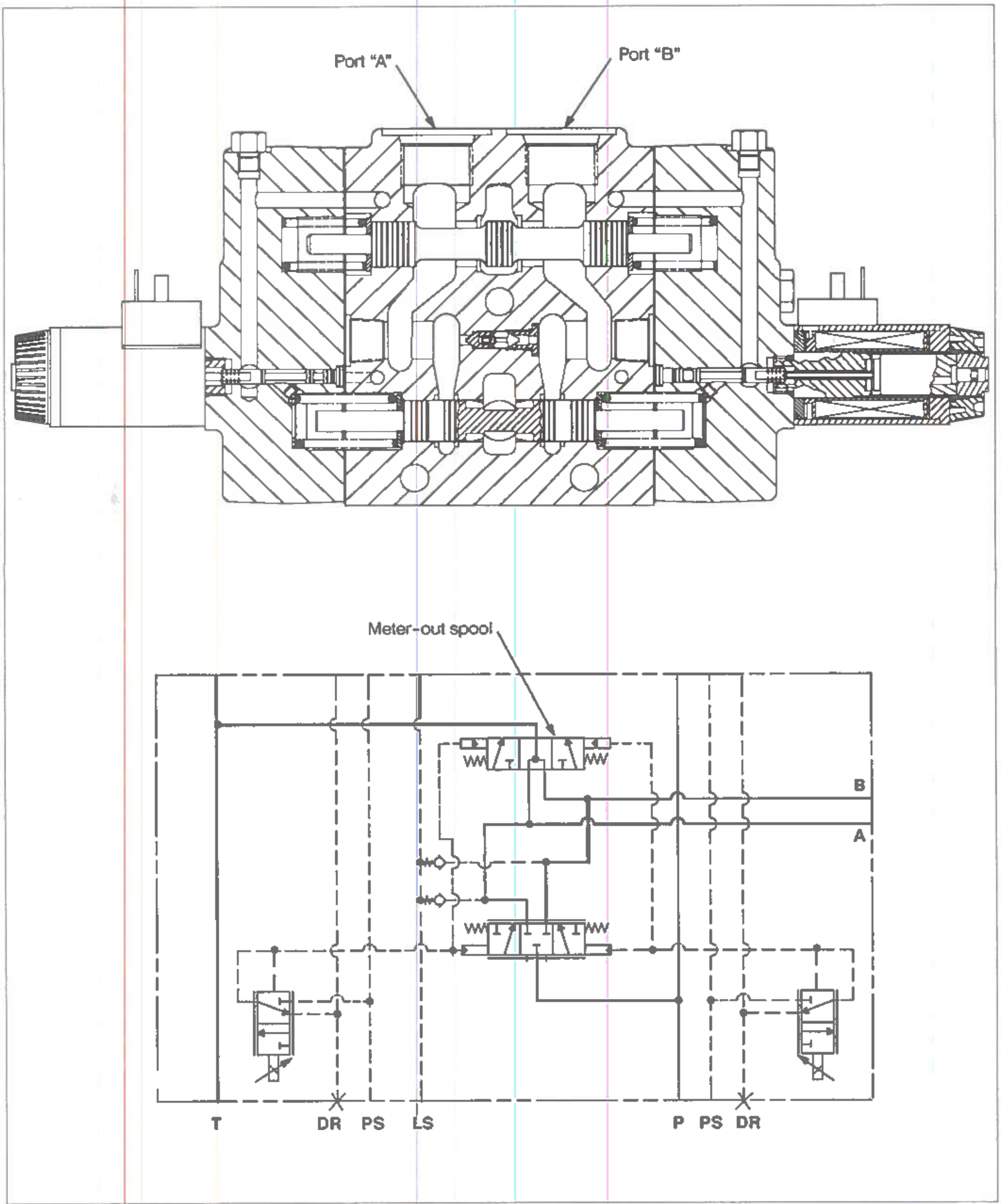
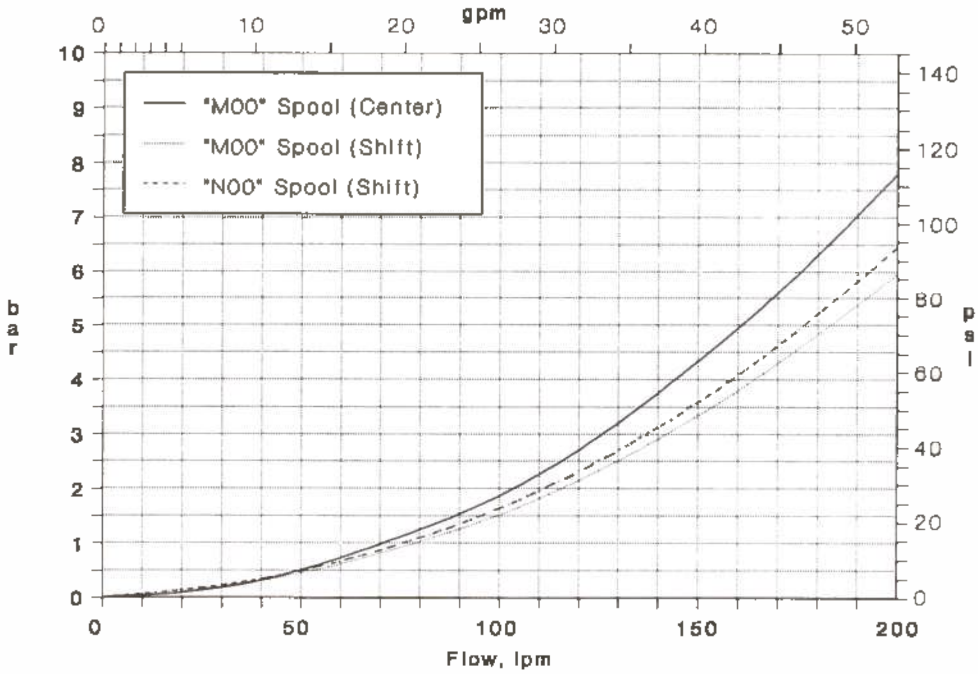


Figure 30

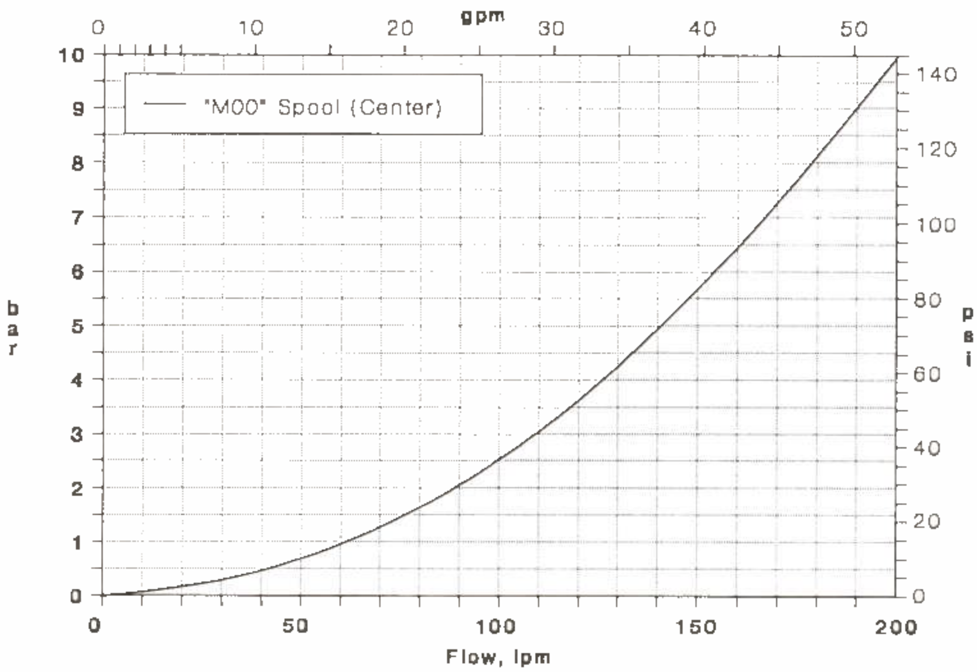
CMX100 METER-OUT SPOOL PERFORMANCE
Flow vs. Pressure Differential A-T
Flow A -> T



NOTE: Centered spool malfunctions at flows above 200 lpm

Figure 31a

CMX100 METER-OUT SPOOL PERFORMANCE
Flow vs. Pressure Differential A-B
Flow A -> T -> B (T Blocked)



NOTE: Centered spool malfunctions at flows above 200 lpm

Figure 31b

Actuator port relief valve

The actuator port relief valve uses a pilot stage to provide a pilot signal to the meter-out servo that, in turn, opens the meter-out poppet to relieve fluid to tank.

The relief valve pilot stage consists of a poppet, seat and spring (Figure 32). When actuator port pressure overcomes the relief valve spring force, the relief valve poppet moves off its seat and fluid flows into the passage in the control cap gasket (on hydraulic models, the relief valve poppet seat is incorporated into the load drop check retainer).

This is the same passage that communicates the meter-in spring chamber to the meter-out piston. A restriction in the control cap gasket is located in this passage between the relief valve poppet and the meter-in spring chamber (between the relief valve poppet and reducing valve on electrohydraulic models). Flow from the relief valve through the restriction causes pressure to build on the relief valve side of the restriction and is transmitted directly to the meter-out piston, which in turn opens the meter-out servo and meter-out poppet, relieving pressure in the actuator port. The relief valve setting is adjustable by shimming the pilot poppet spring. Relief valve override characteristics are given in Figures 33 and 34.

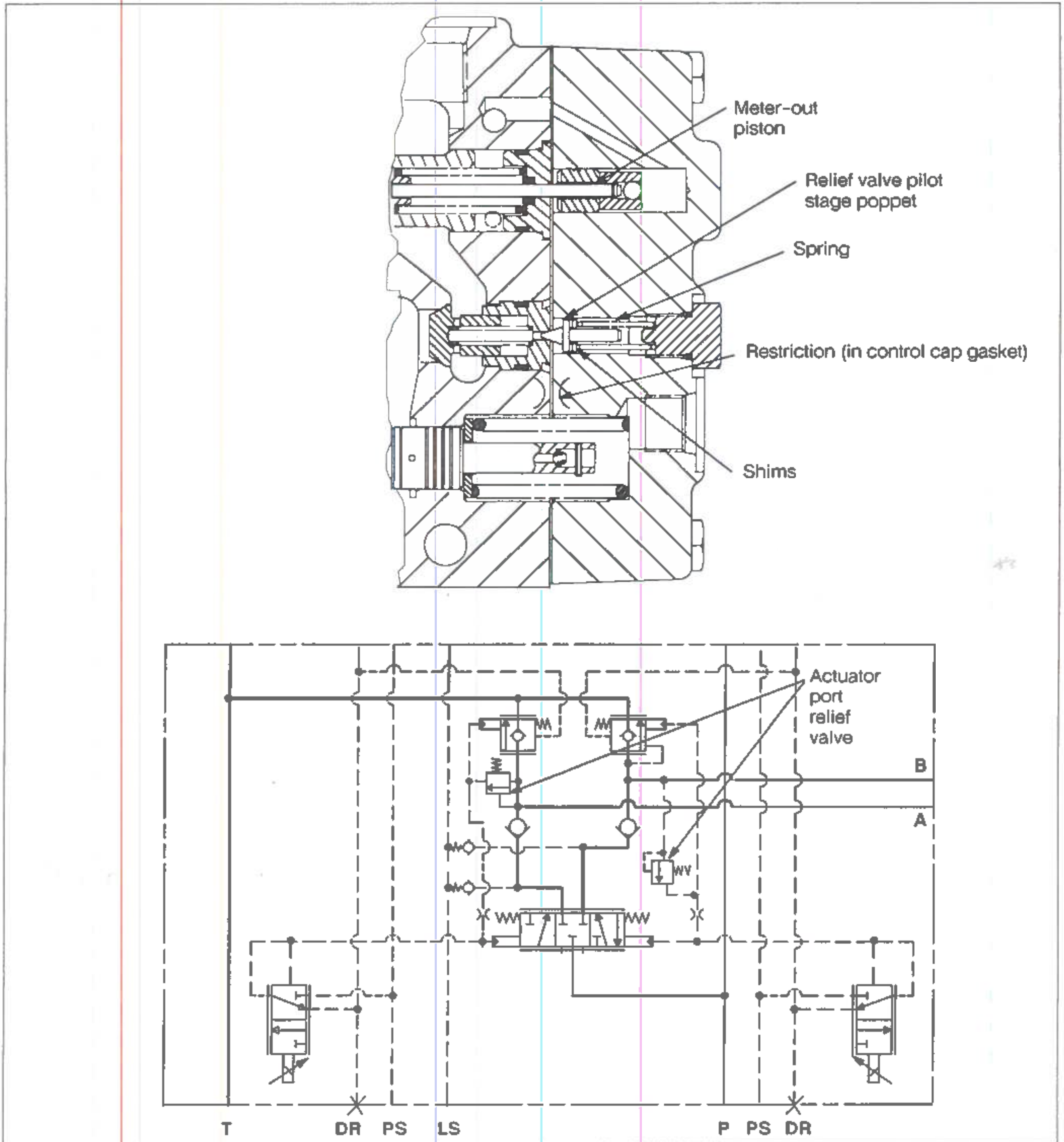


Figure 32

CMX100 SECTIONAL VALVE
RELIEF VALVE OVERRIDE
"S03" METER-OUT POPPET

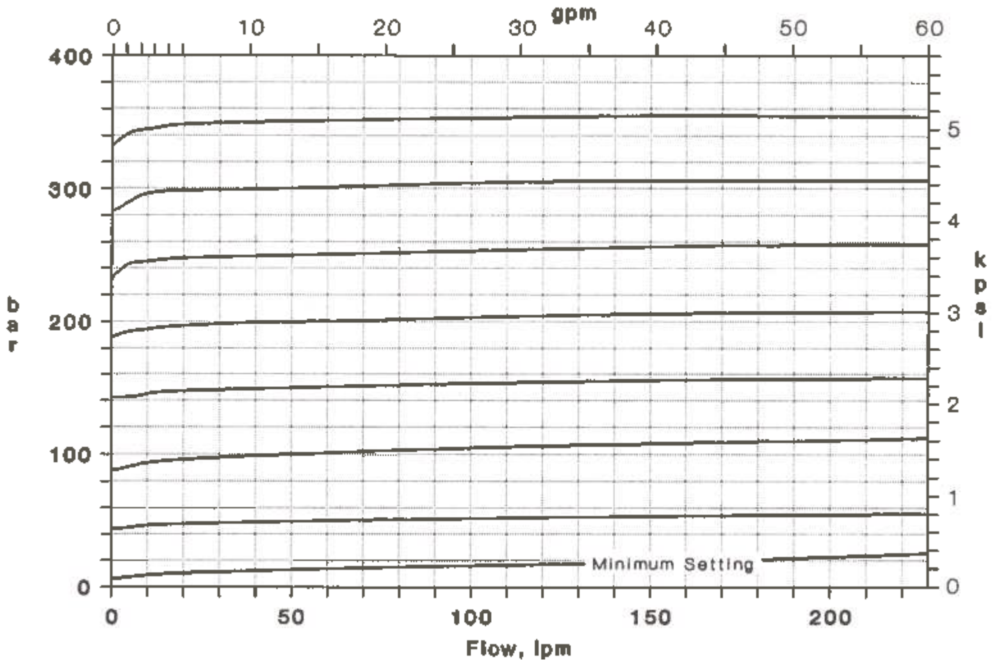


Figure 33a

CMX100 SECTIONAL VALVE
RELIEF VALVE OVERRIDE
"S14" METER-OUT POPPET

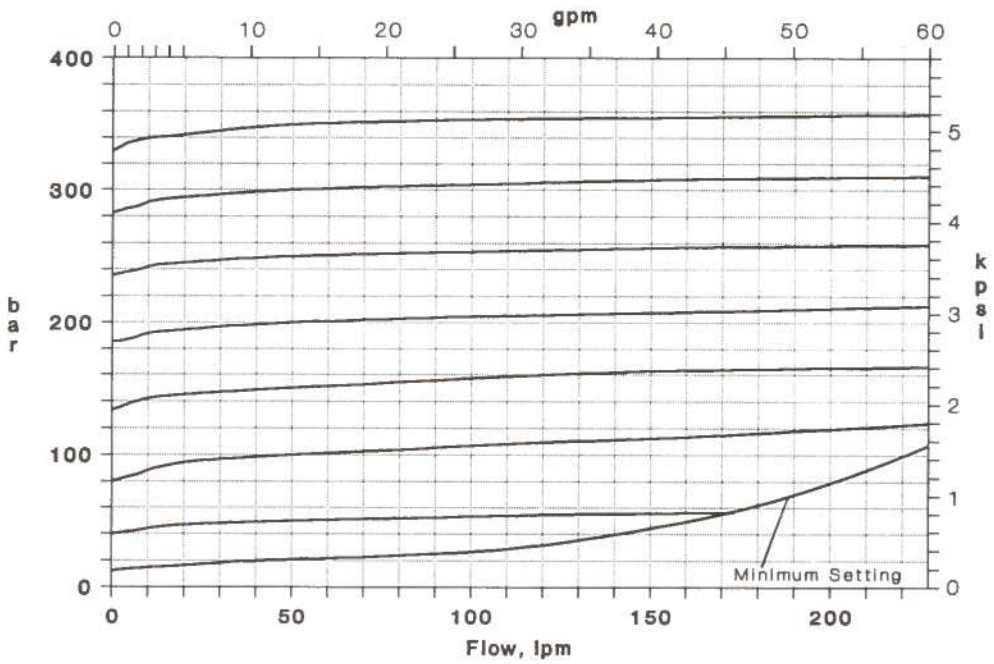


Figure 33b

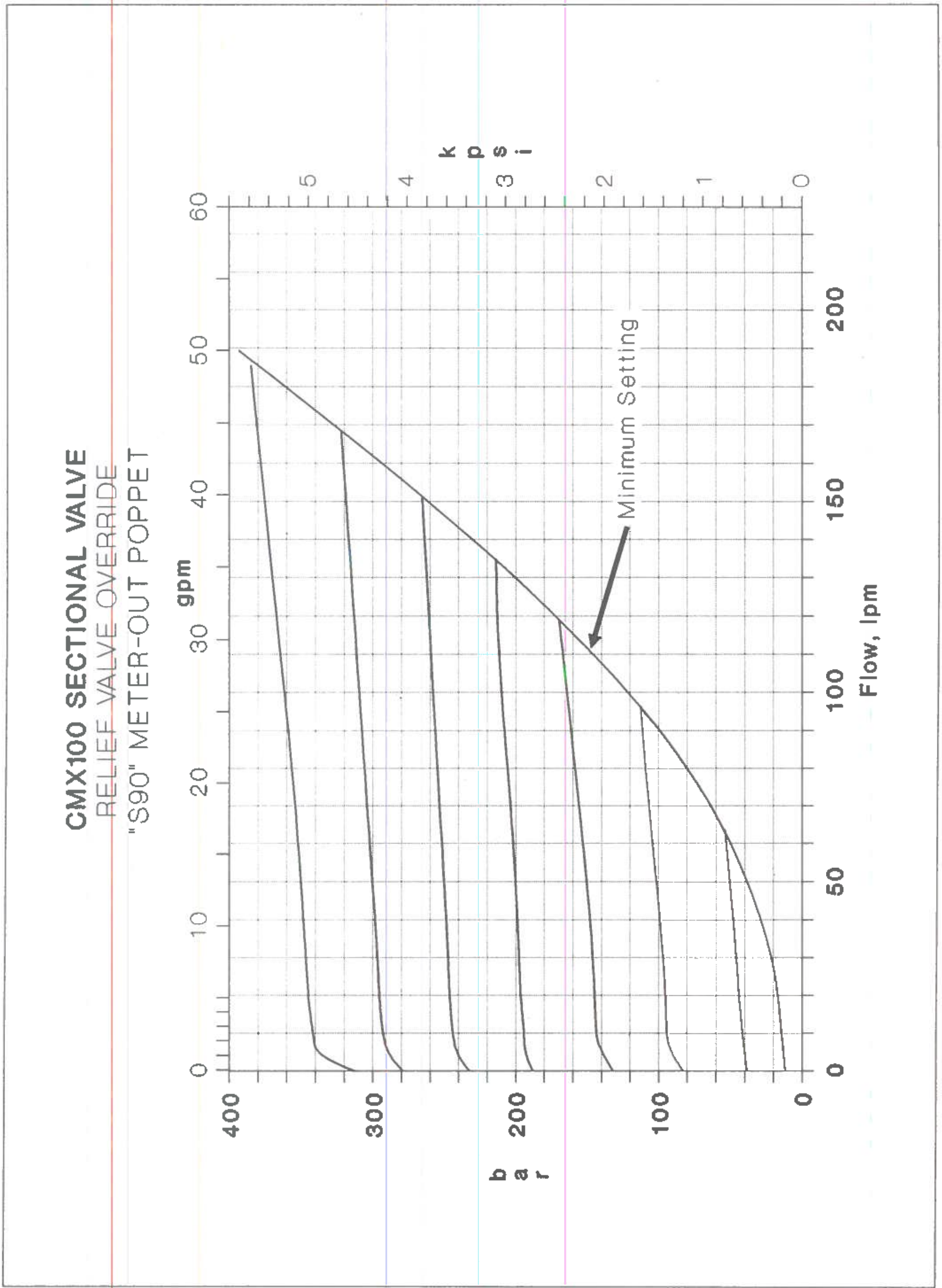

CMX100 SECTIONAL VALVE
RELIEF VALVE OVERRIDE
"S90" METER-OUT POPPET
Minimum Setting
gpm
Flow, lpm
bar
kpsi

Figure 33c

CMX160 SECTIONAL VALVE
RELIEF VALVE OVERRIDE
"S04" METER-OUT POPPET

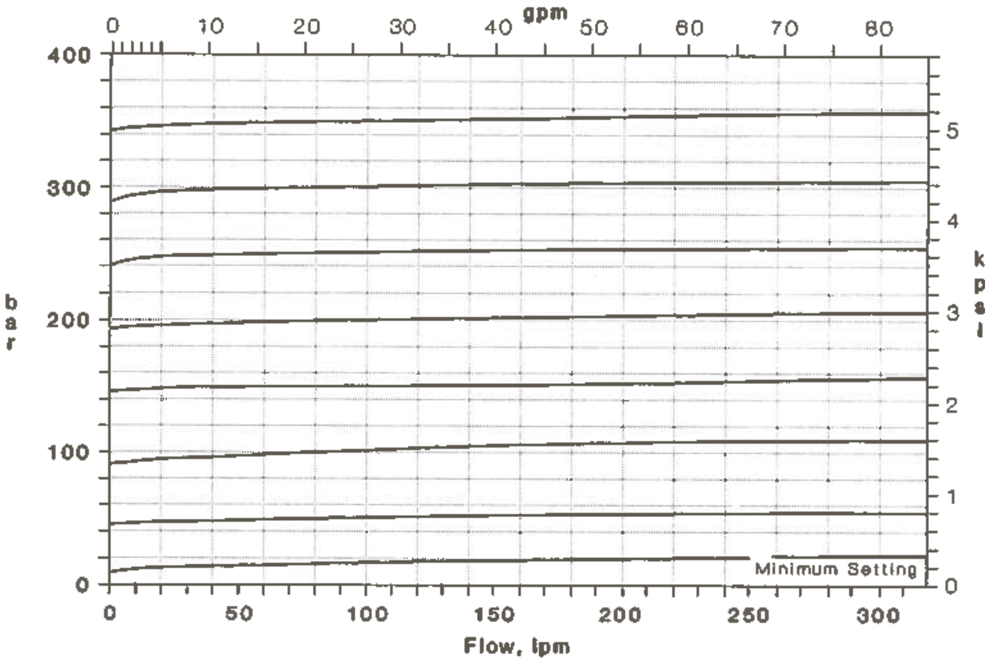


Figure 34a

CMX160 SECTIONAL VALVE
RELIEF VALVE OVERRIDE
"S07" METER-OUT POPPET

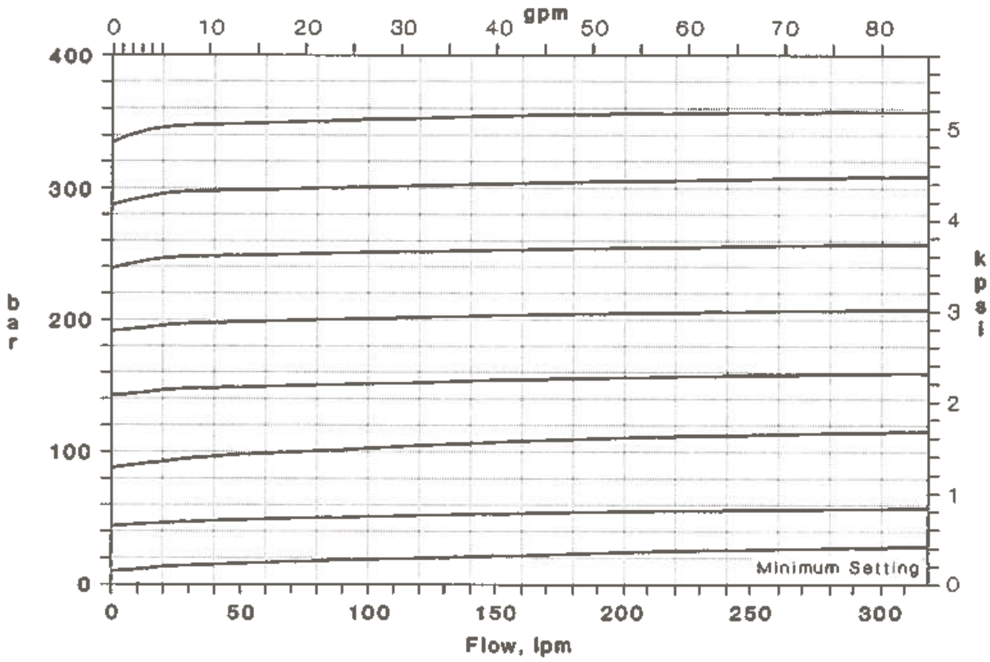


Figure 34b

CMX160 SECTIONAL VALVE
RELIEF VALVE OVERRIDE
"S14" METER-OUT POPPET

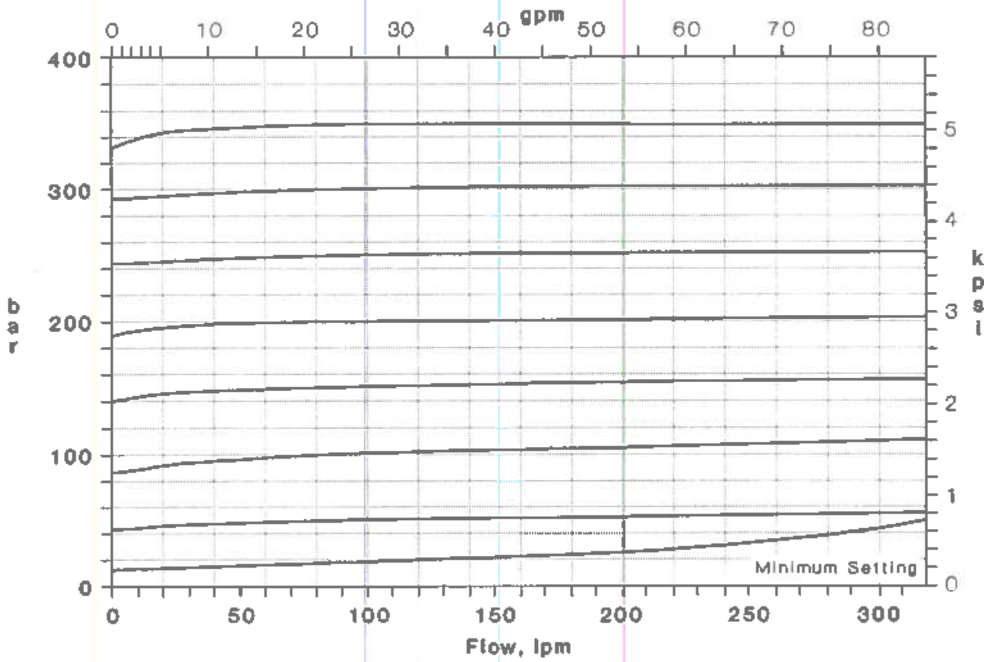


Figure 34c

CMX160 SECTIONAL VALVE
RELIEF VALVE OVERRIDE
"S56" METER-OUT POPPET

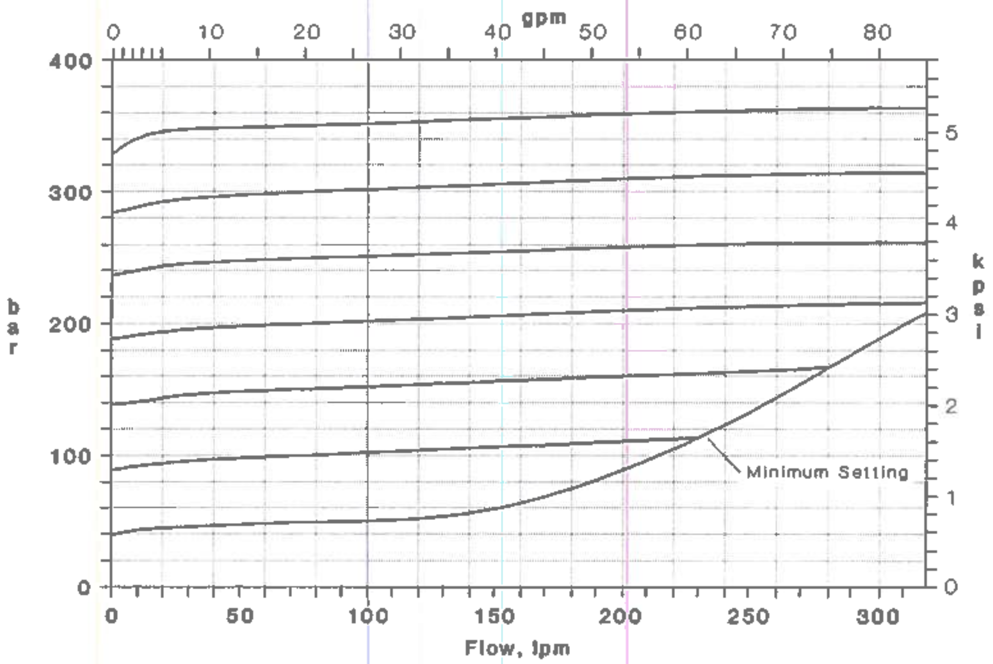


Figure 34d

Hydraulic actuation

Pilot pressure is supplied to each section via two #6 SAE O-ring boss ports (.563-18 UNF-2B straight thread) located on each control cap. Pilot drain connections can be made internally to the tank port or externally to the reservoir. External drain is always the preferred configuration and MUST be used if tank pressure is high due to the installation or a back pressure check valve, or if high pressure transients ("spikes") are likely.

It is important to note that the meter-out servo is referenced to the valve bank drain, while the meter-in spool is referenced to the opposite port command pressure. This requires the HRC drain pressures to be considered, since different drain pressures for the valve bank and the HRC will alter meter-in and meter-out phasing. Ideally, both the HRC and the CMX valve bank should be drained directly to reservoir via generous lines.

Hydraulic actuation data is given below.

Pilot Pressure	M/O bar (psi)	M/I "06" Spring bar (psi)	M/I "12" Spring bar (psi)
Crack	4.2 (61)	6.2 (90)	11.4 (175)
Rated flow	13.8 (200)	15.5 (225)	20.7 (300)

Tolerance: ± 1 bar

Pilot Requirements:

Pressure: 34 bar (500 psi) max.
Flow: 12 lpm (3 USgpm) recom.
Filtration: 25 microns or finer

Required shift volume (displacement):

Metering	CMX100	CMX160
M/I (neutral to full stroke)	1.63 cc	2.56 cc
M/O	1.01 cc	2.56 cc

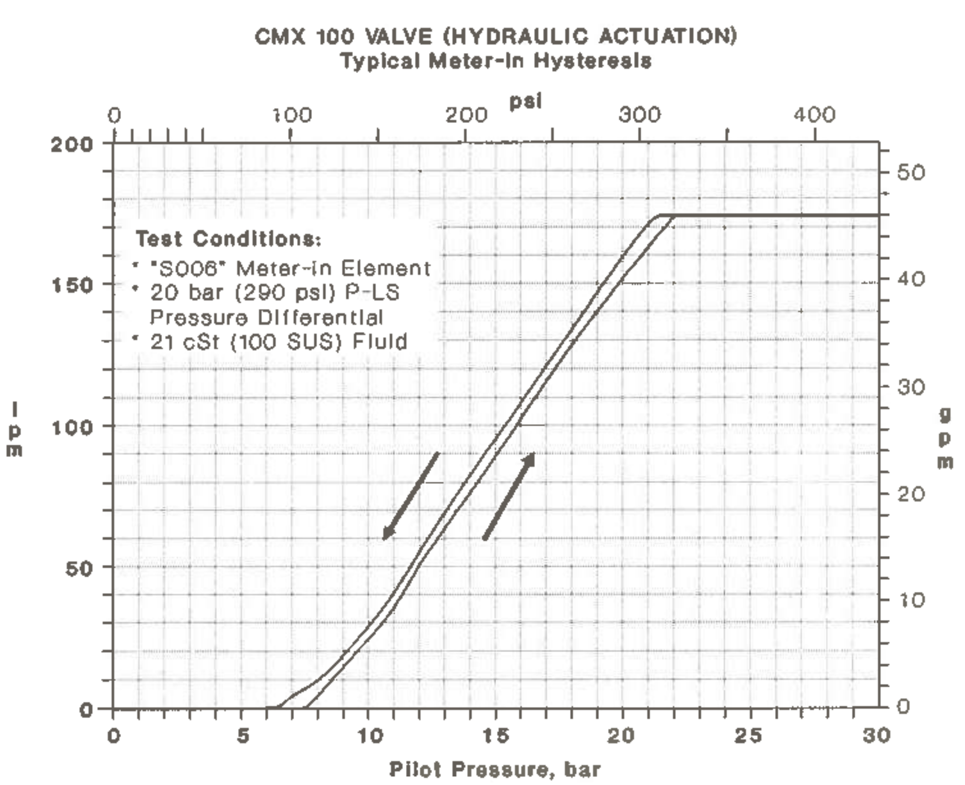


Figure 35a

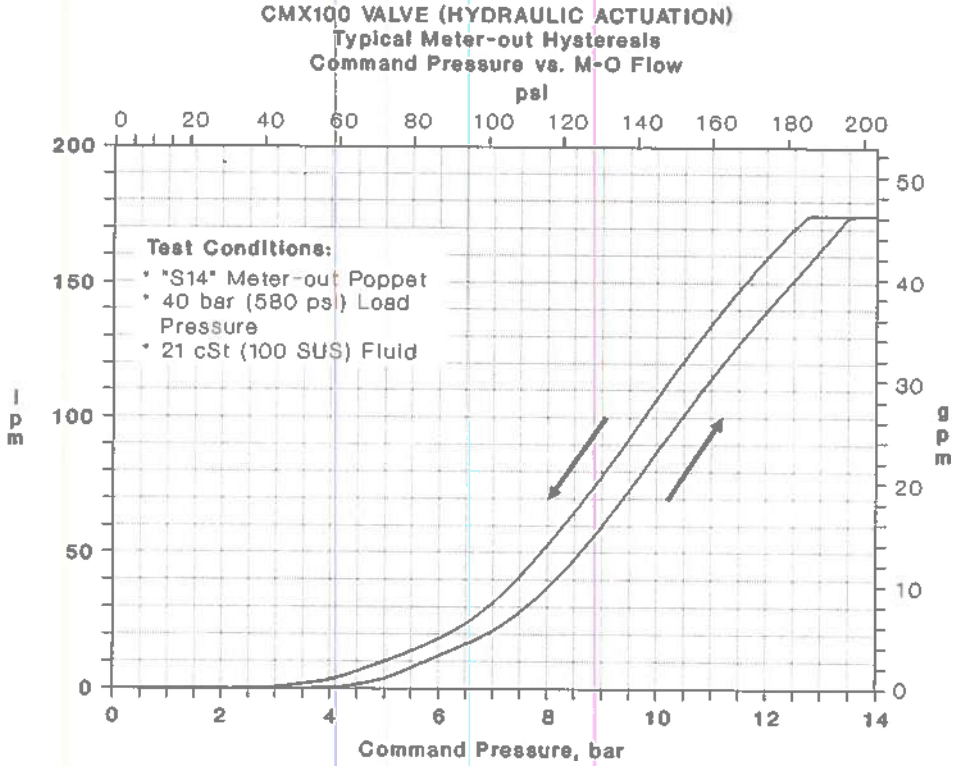


Figure 35b

Electrohydraulic actuation

Electrohydraulic CMX sectional valves operate on the same principles as the hydraulic valves, with the addition of an electrohydraulic proportional reducing valve (Figure 36) to convert an electrical input signal to a proportional command pressure signal that operates the valve. The solenoid provides an output force proportional to the input current that acts on the solenoid end of the pilot spool.

When the solenoid is energized, the pilot spool is moved away from the solenoid, closing the command port to tank and opening the pilot supply to the command port. Command port pressure is supplied to the feedback end of the pilot spool through the passage in the end cap gasket. When the feedback pressure begins to balance the solenoid force, the pilot spool closes the pilot supply passage. As the command pressure rises (due to leakage), the feedback pressure overcomes the solenoid, and the pilot spool moves to open the control port to tank. The pilot spool modulates to balance the feedback pressure against the solenoid output force, thus providing an output pressure proportional to the solenoid input current. The pilot spool and bore are designed for zero overlap, so deadband is minimized.

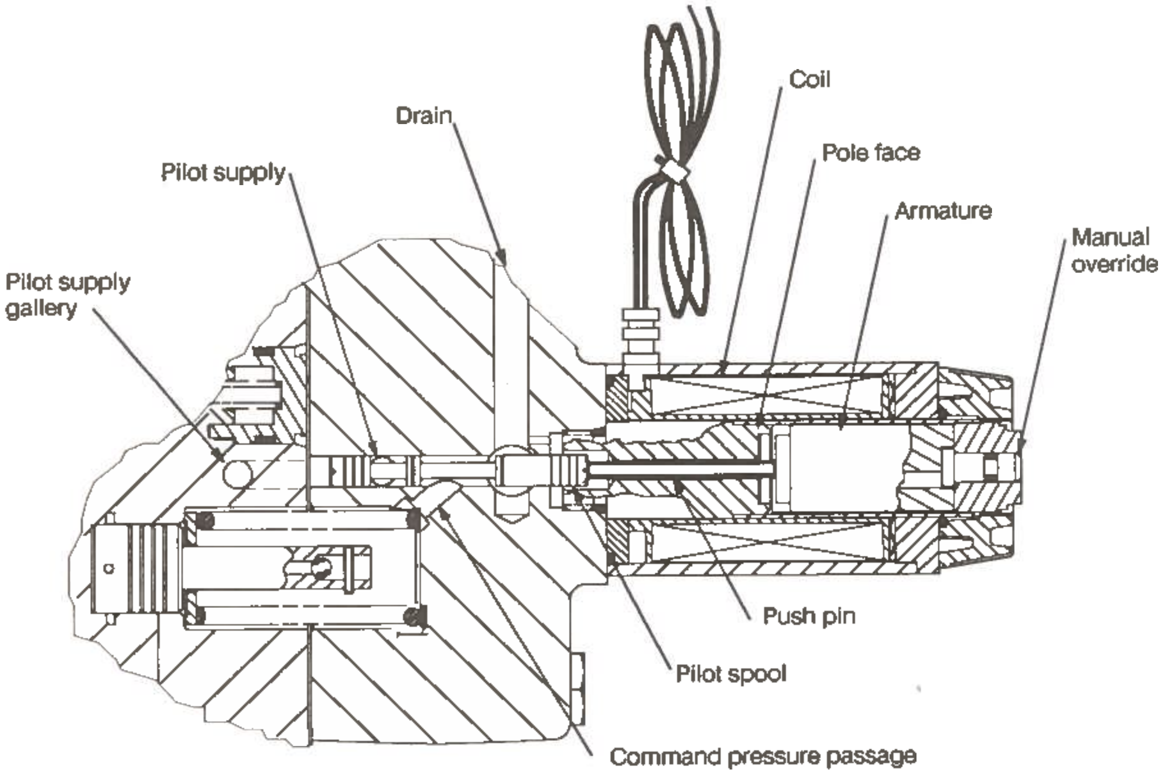
The pressure output serves as the command pressure to actuate the CMX meter-in and meter-out elements. The signal to the solenoid should be conditioned to a pulse width modulated voltage or current signal. DC power, up to the coil rating, may also be used for "on-off" operation.

Supply Voltages:	12/24 VDC
Maximum Current:	1.4/.7 AMP
Recommended PWM Freq./Dither Freq.:	100 Hz

Solenoids are available with DIN standard 43650 plugs, SAE 6.35 mm (.250 in.) male blade connectors, or flying leads.

Valves are available with either internal or external pilot supply. On models with the internal pilot option, pilot pressure is supplied to the proportional reducing valve by an internal passage that is connected to the system supply passage in the inlet body. These models require that the minimum system pressure be maintained to the specified limits to assure proper valve actuation.

Electrohydraulic CMX valves may be operated manually in the event of electrical control failure by depressing the manual override pin, located on the end of each solenoid, with a screwdriver or similar tool.


Coil
Drain
Pole face
Pilot supply
Armature
Manual
override
Pilot supply
gallery
Push pin
Pilot spool
Command pressure passage

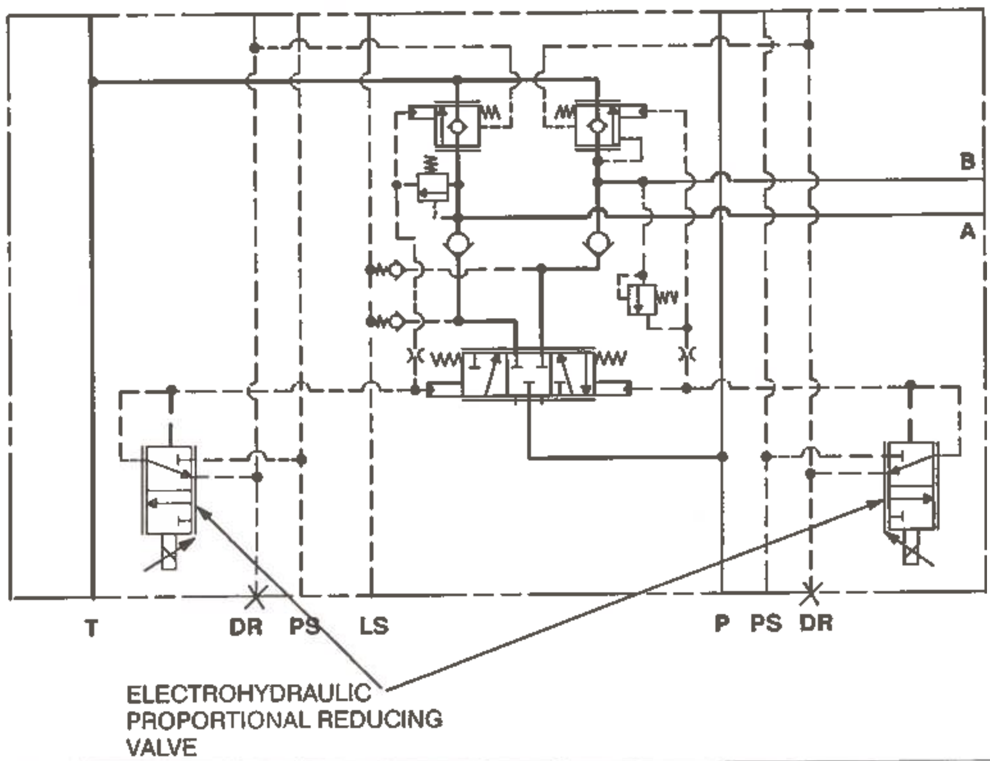

B
A
T
DR
PS
LS
P
PS
DR
ELECTROHYDRAULIC
PROPORTIONAL REDUCING
VALVE

Figure 36

Electrohydraulic actuation

Internal pilot supply

Minimum system pressure:

Valves with Type "06" meter-in spring - 19 bar (275 psi)

Valves with Type "12" meter-in spring - 24 bar (350 psi)

External pilot supply

Minimum pressure:

Valves with Type "06" meter-in spring - 19 bar (275 psi)

Valves with Type "12" meter-in spring - 24 bar (350 psi)

Since both electrohydraulic reducing valves are referenced to a common drain via the end cover, drain pressure is not critical. Internal drain to tank and external drain options are available.

If high pressure transients are present in the tank line, then external drain should be used to avoid function interaction. If the tank pressure is above 8.6 bar (125 psi), then external drain should be used to avoid exceeding the pressure rating for the pilot passages (35 bar [500 psi]).

Under certain operating conditions (high inlet pressure, fully shifted, and open relief valve), pilot drain flow can be as high as 4 lpm (1 USgpm) for each active section. Total anticipated drain flow must be considered when sizing drain lines.

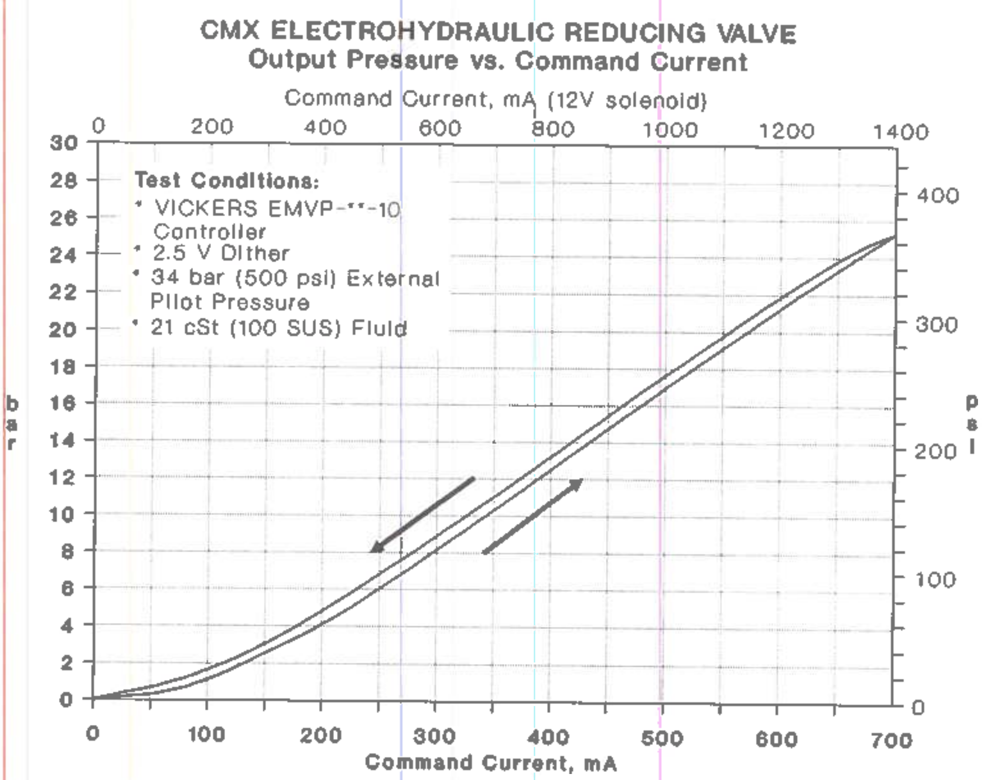


Figure 37

CMX 100 RELIEF VALVE RESPONSE
Actuator Port Pressure vs. Time

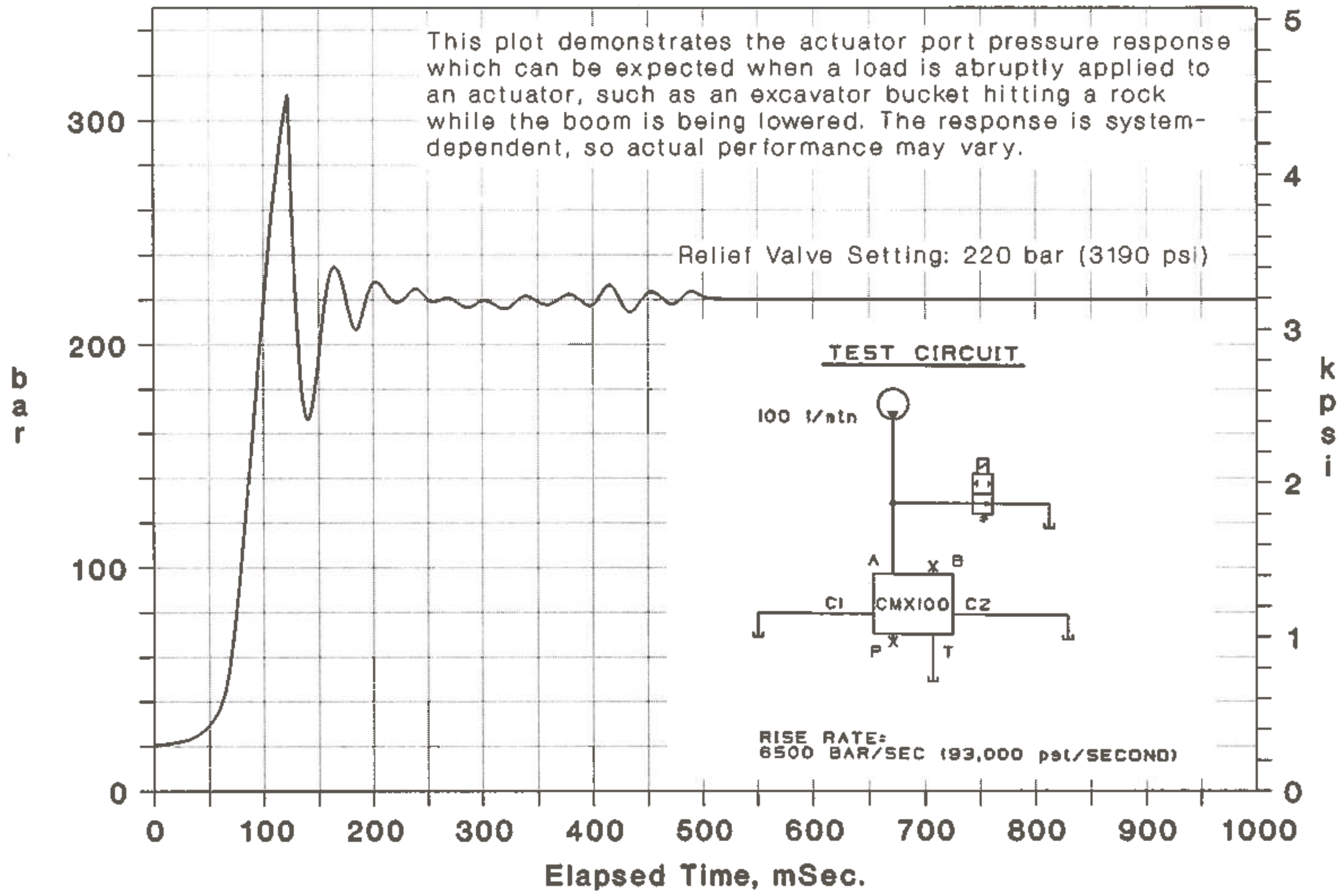


Figure 38a

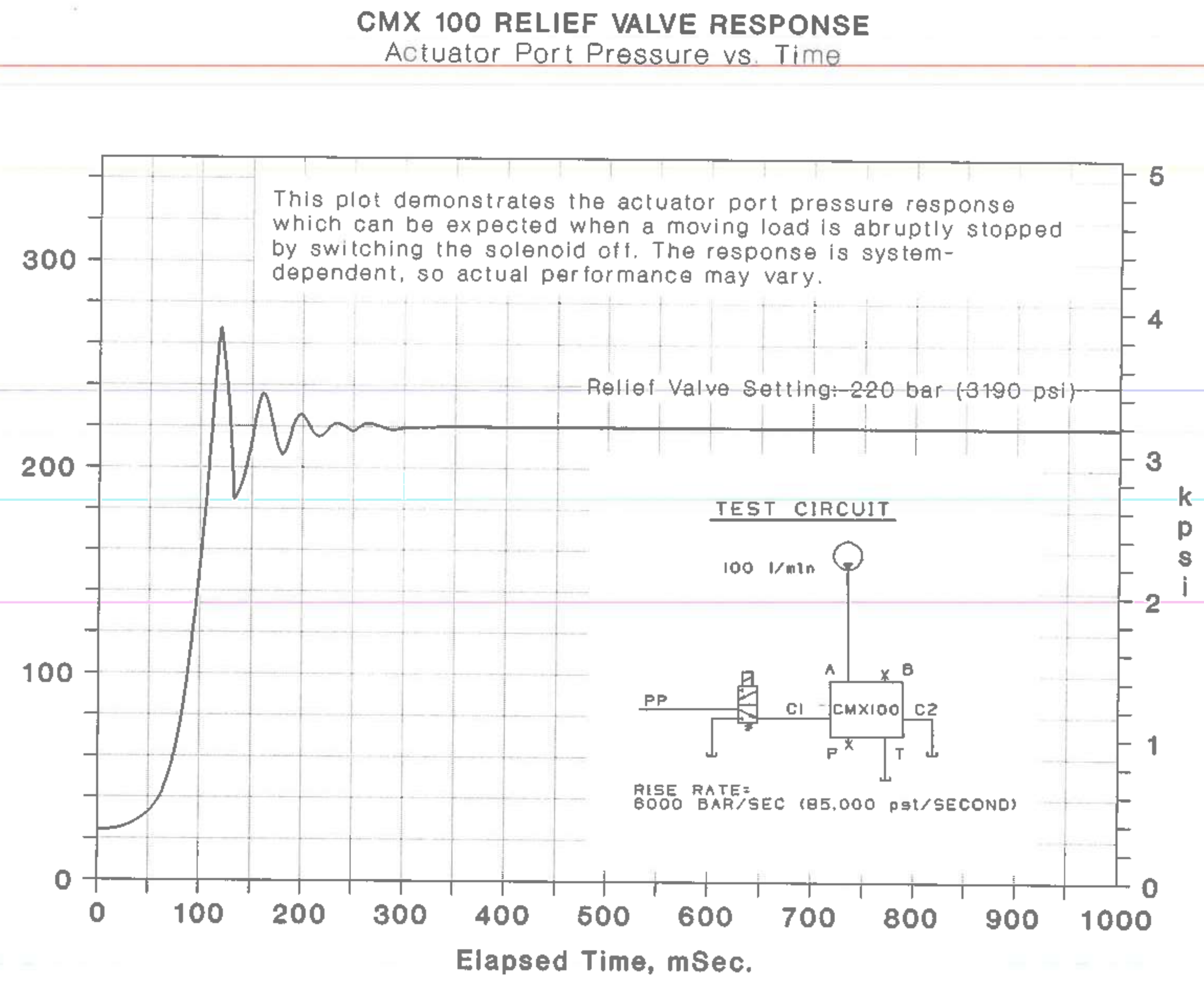

CMX 100 RELIEF VALVE RESPONSE
Actuator Port Pressure vs. Time
This plot demonstrates the actuator port pressure response which can be expected when a moving load is abruptly stopped by switching the solenoid off. The response is system-dependent, so actual performance may vary.
Relief Valve Setting: 220 bar (3190 psi)
TEST CIRCUIT
100 l/min
PP
CI
CMX100
C2
A
B
P
T
RISE RATE:
6000 BAR/SEC (85,000 psi/SECOND)
bar
kpsi
0
100
200
300
1
2
3
4
5
0
100
200
300
400
500
600
700
800
900
1000
Elapsed Time, mSec.

Figure 38b

CMX 100 RELIEF VALVE RESPONSE

Actuator Port Pressure vs. Time

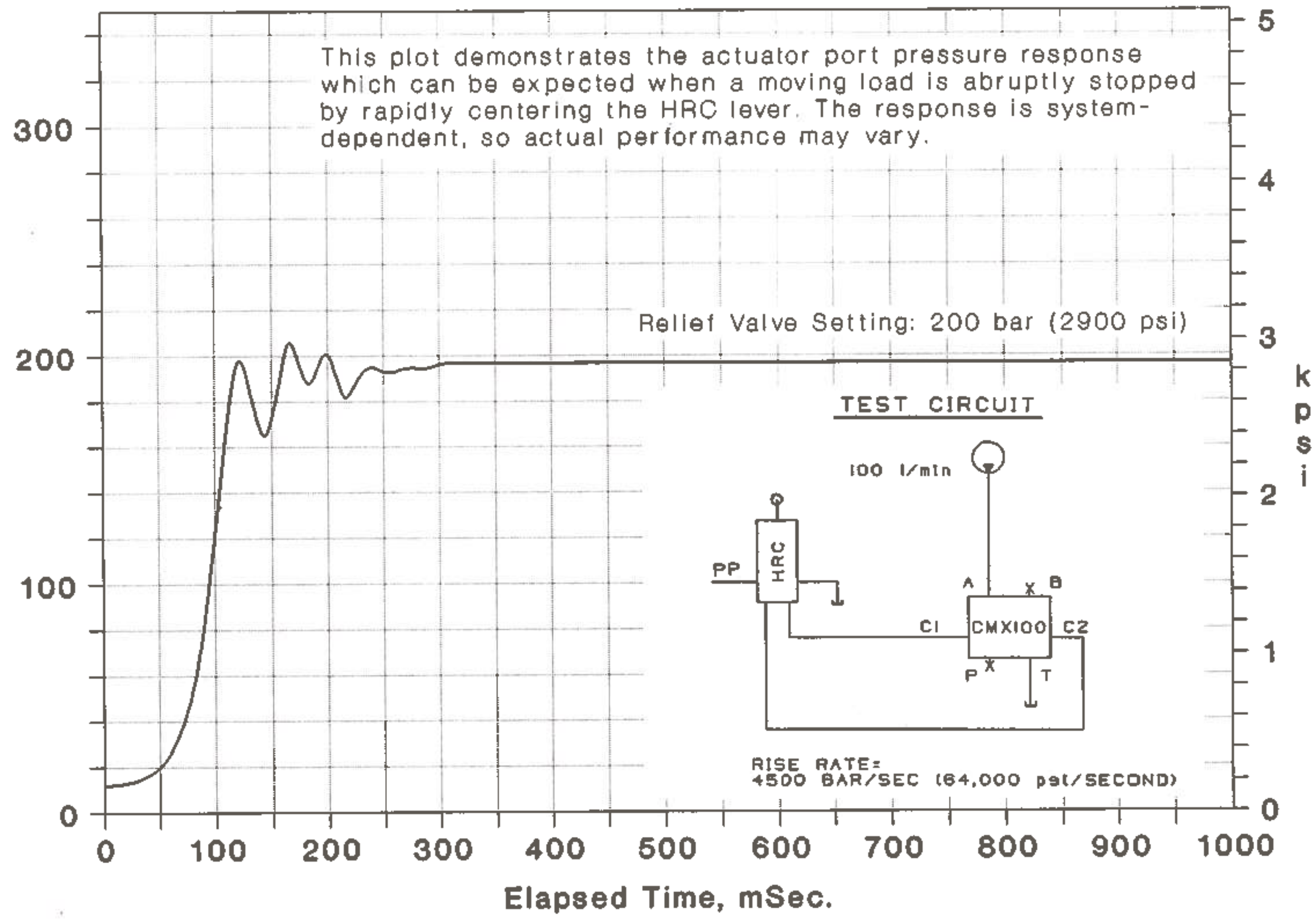


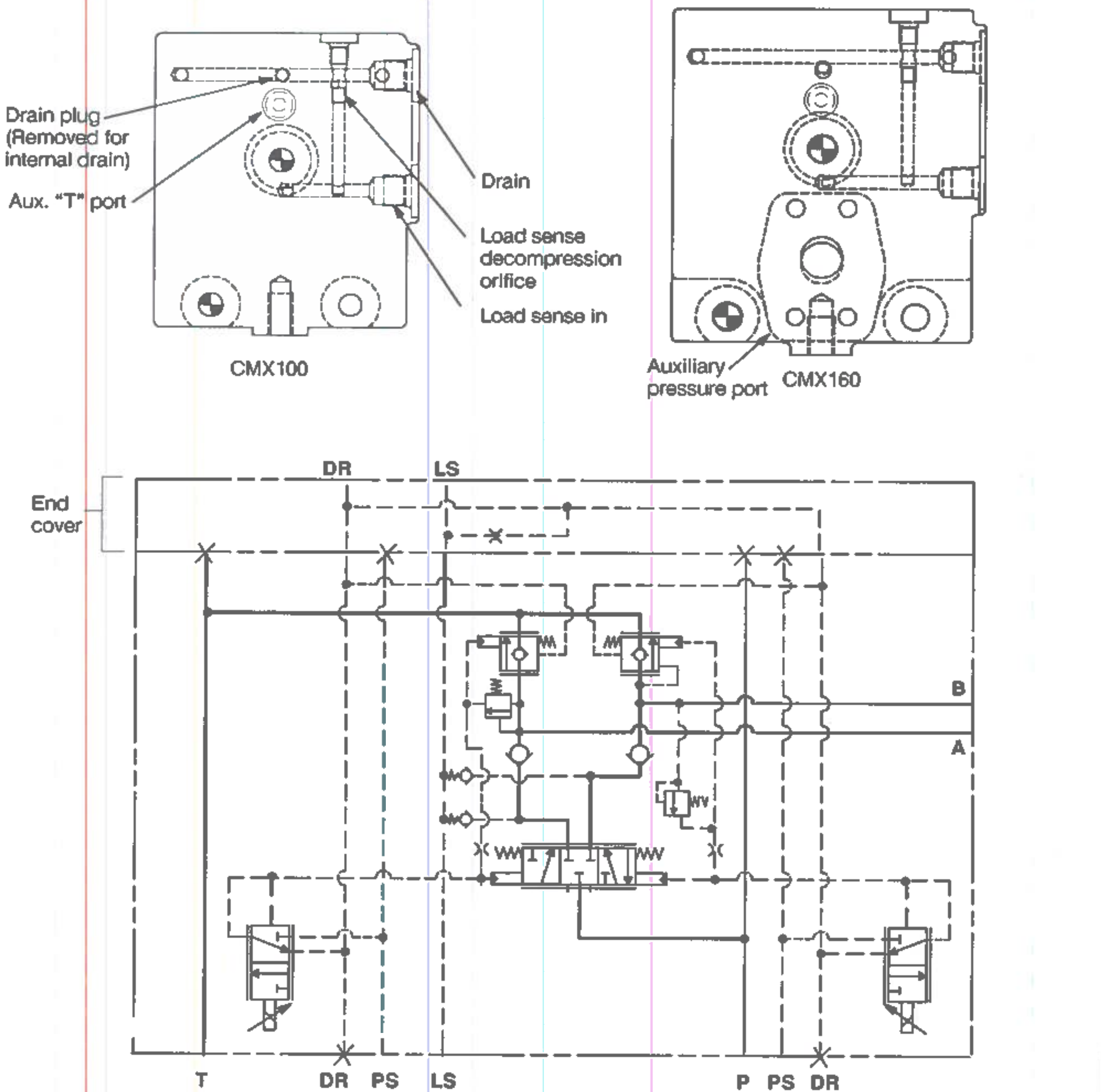
Figure 38c

End Cover

An end cover (Figure 39) is required to terminate each valve bank. The end cover provides a passage that connects the control cap drain galleries from either side of the valve body.

Additionally, several optional features are located in the end cover:

Internal/external drain:	Provides choice of internal or external drain (see "Actuation", pages 45 and 46).
Aux. load sense:	Provides load sense series connection for multiple valve banks (see "Load Sensing Check Valves", page 24).
Load sense decompression orifice:	Provides load sense decompression to drain via a 0.50 mm (.020") screened orifice.
Load sense decompression valve:	Provides pressure compensated decompression flow to drain for reduced power loss.
Aux. "P" Port:	Augments "P" port in inlet body for special applications.
Aux. "T" Port:	Augments "T" port in inlet body for special applications.



End cover (Shown with load sense decompression orifice and external drain)

Figure 39

Special features

Meter–in pressure limitation

In this version (Figure 40), the orifice restriction in the control cap gasket is relocated to the inlet to the meter–in spring chamber.

This feature limits meter–in flow at a preset actuator port pressure.

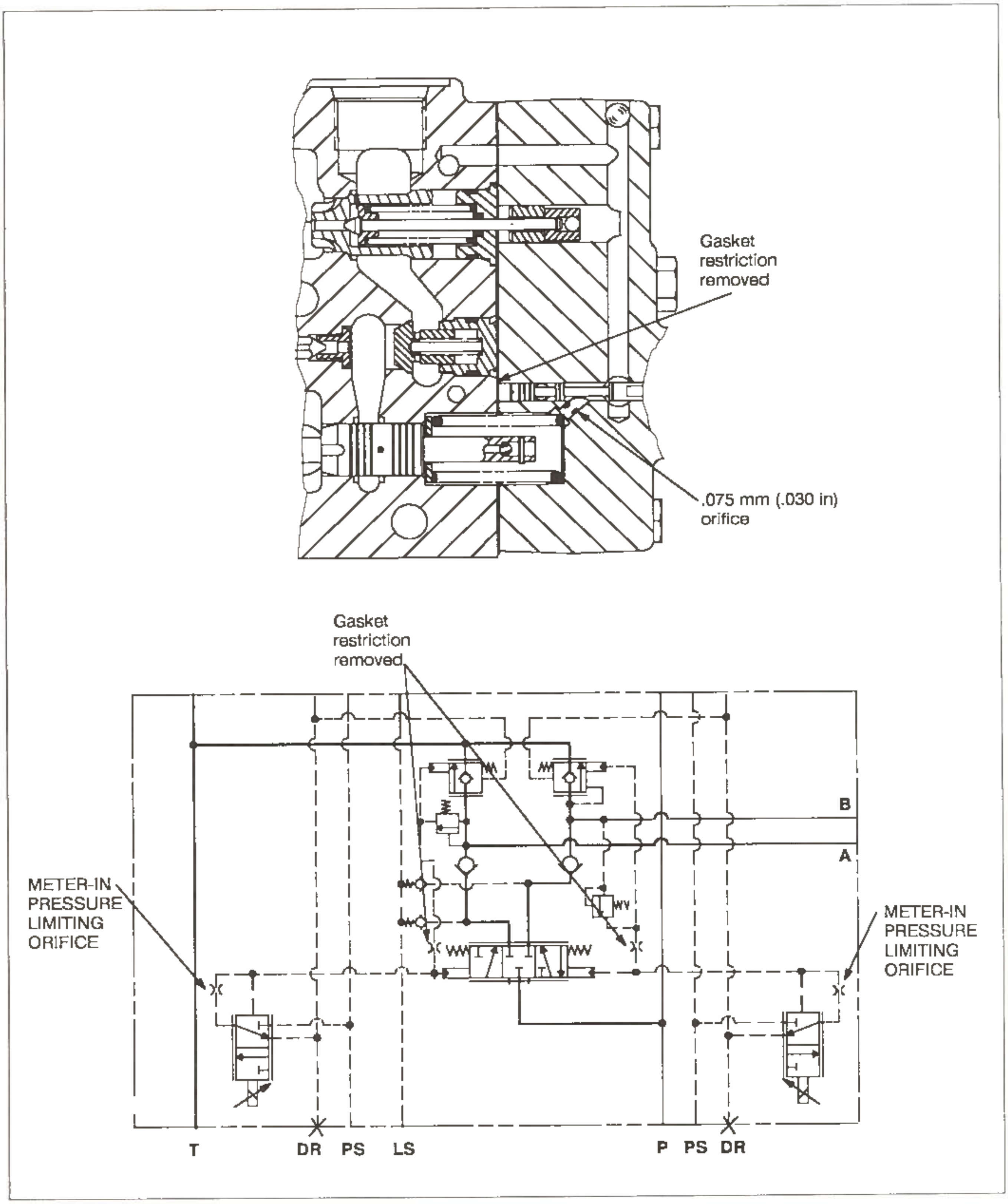


Figure 40

Meter-in pressure limitation

Meter-out poppet version (with port relief valves)

In valves with meter-out poppets, the port relief functions in the normal manner. But because the orifice has been relocated, the relief valve pilot stage also applies pilot pressure to the meter-in spool, which tends to oppose the command pressure. For example, assume we are driving a clamp cylinder "P" to "A". When the cylinder fully clamps, the "A" port relief setting is reached, and the pilot stage opens and builds pilot pressure to open the meter-out element. This pilot pressure also acts on the meter-in spool opposing the command pressure and tending to close the meter-in spool, which reduces the meter-in flow.

Since a pilot pressure of 4.2 bar (62 psi) is required to open the meter-out poppet, a significant reduction in flow, equivalent to 4.2 bar (62 psi) command pressure, through the meter-in spool will occur before the meter-out poppet opens. From the meter-in command vs. flow diagrams on page 13, the reduction in flow is about 50 lpm (13 USgpm) for the CMX100, and about 70 lpm (18 USgpm) for the CMX160.

The total amount of closing depends on the command signal and is limited by the relief valve override. When the meter-out element is opened enough to pass the full meter-in flow, further increase in relief valve pilot signal will not occur and, in turn, further shutoff of the meter-in is not possible. In Figure 41 the diagram shows the resulting inlet flow as the load pressure changes while the command current is fixed.

The meter-in pressure limitation feature limits horsepower losses through the open relief valves of a function with relief settings below the system pressure setting. It is particularly effective for swing functions where the relief valves are set to limit maximum torque. On these applications, with a moving load, meter-in pressure limitation can prevent any losses over an open port relief valve. The meter-in pressure limitation feature should be used with caution on functions where an overrunning gravity load is possible. With certain combinations of meter-out poppets and cylinder area ratios, uncommanded movement may occur.

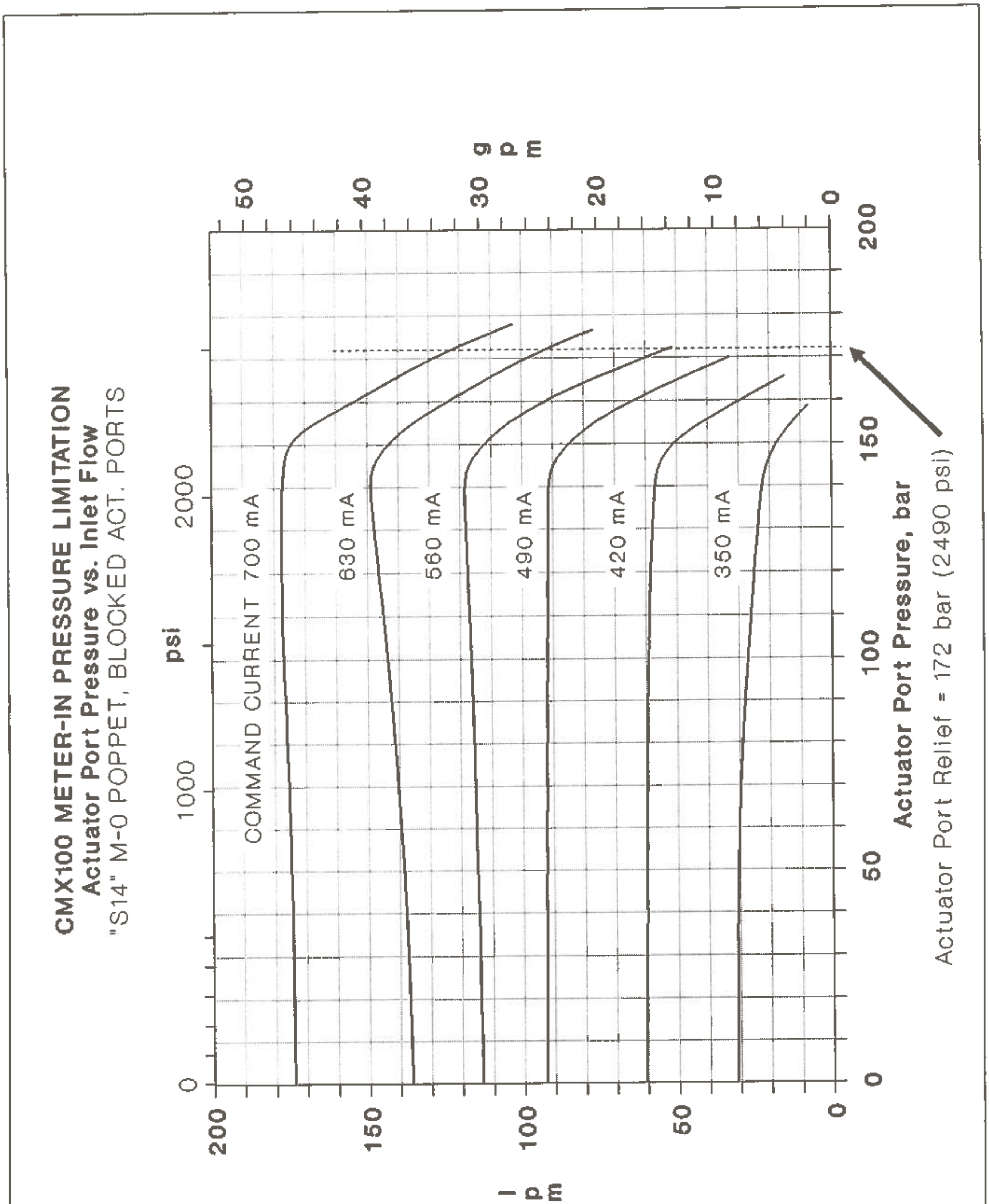
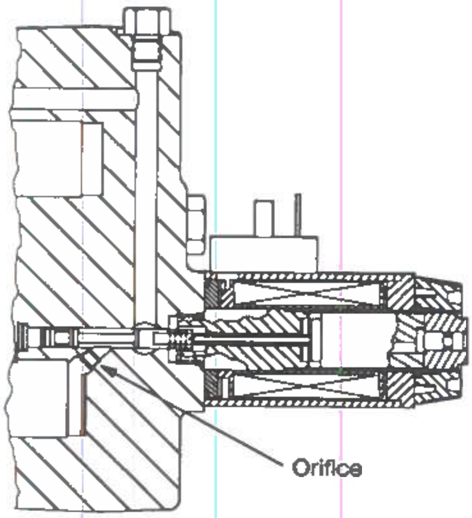

CMX100 METER-IN PRESSURE LIMITATION
Actuator Port Pressure vs. Inlet Flow
"S14" M-0 POPPET, BLOCKED ACT. PORTS
psi
0
1000
2000
g
p
m
50
40
30
20
10
0
COMMAND CURRENT 700 mA
630 mA
560 mA
490 mA
420 mA
350 mA
l
p
m
200
150
100
50
0
0
50
100
150
200
Actuator Port Pressure, bar
Actuator Port Relief = 172 bar (2490 psi)

Figure 41

Meter-in pressure limitation

Meter-out spool version (no actuator port relief)

In valves with the meter-out spool option (Figure 42), a relief valve pilot stage is added (no relief pilot stage is present in the standard configuration), and the orifice is located in the inlet to the meter-in spring chamber. When the pilot stage opens, the resulting pilot signal is applied to both the meter-in and the meter-out spools, opposing the command pilot pressure and tending to close both spools. Due to the phasing of the meter-in and meter-out spools (the meter-in requires a higher pilot pressure to crack), the meter-in spool will completely shutoff flow before the meter-out spool will port fluid to tank. Thus, virtually no horsepower is lost when the function is stalled. This feature controls the maximum pressure to a function at a setting below the system pressure setting.



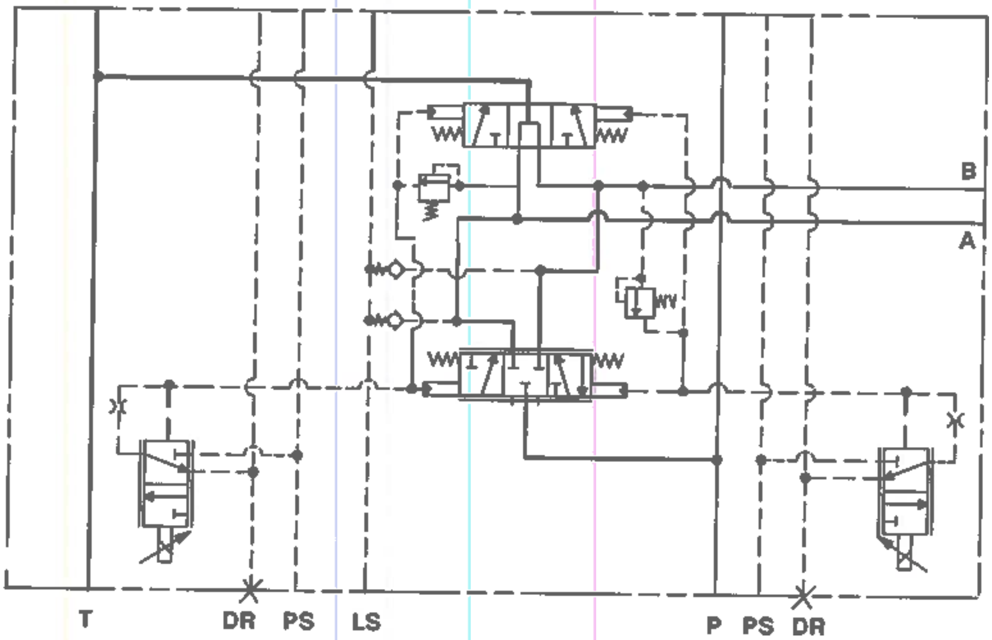


Figure 42

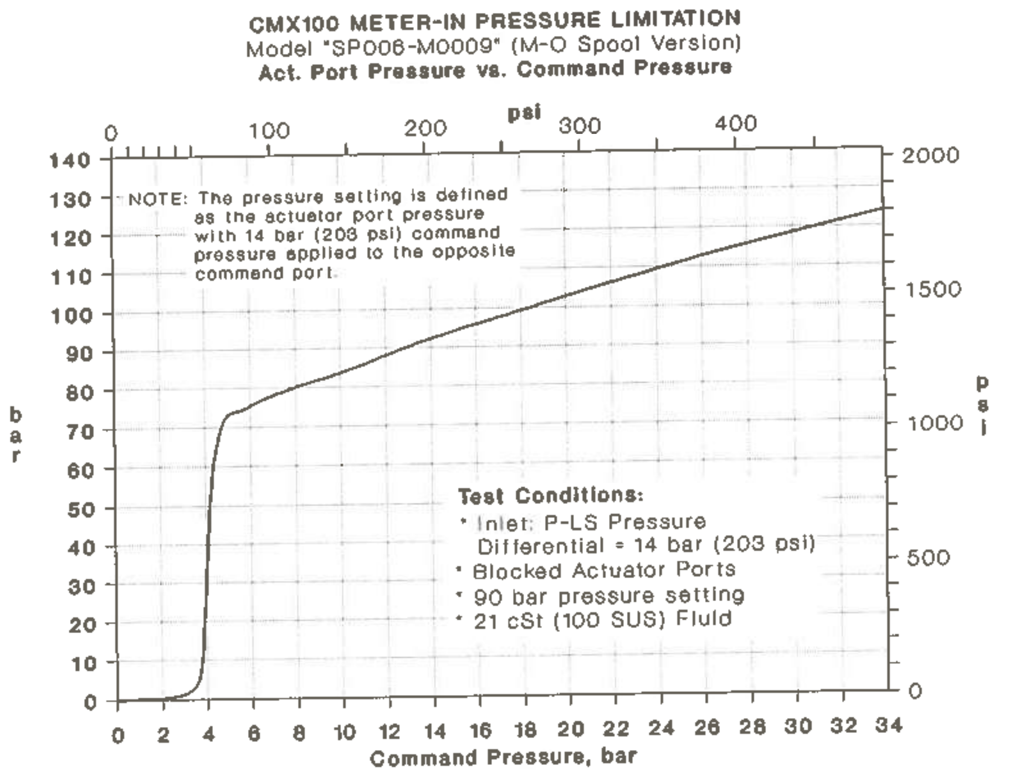


Figure 43

Swing drive with free coast

This function utilizes a meter-out spool and a pressure controlling meter-in element. Combining these features provides acceleration control with minimal braking. Typical applications include swing drives and propel functions where braking control is not required or is accomplished by a mechanical brake.

High flow single acting CMX

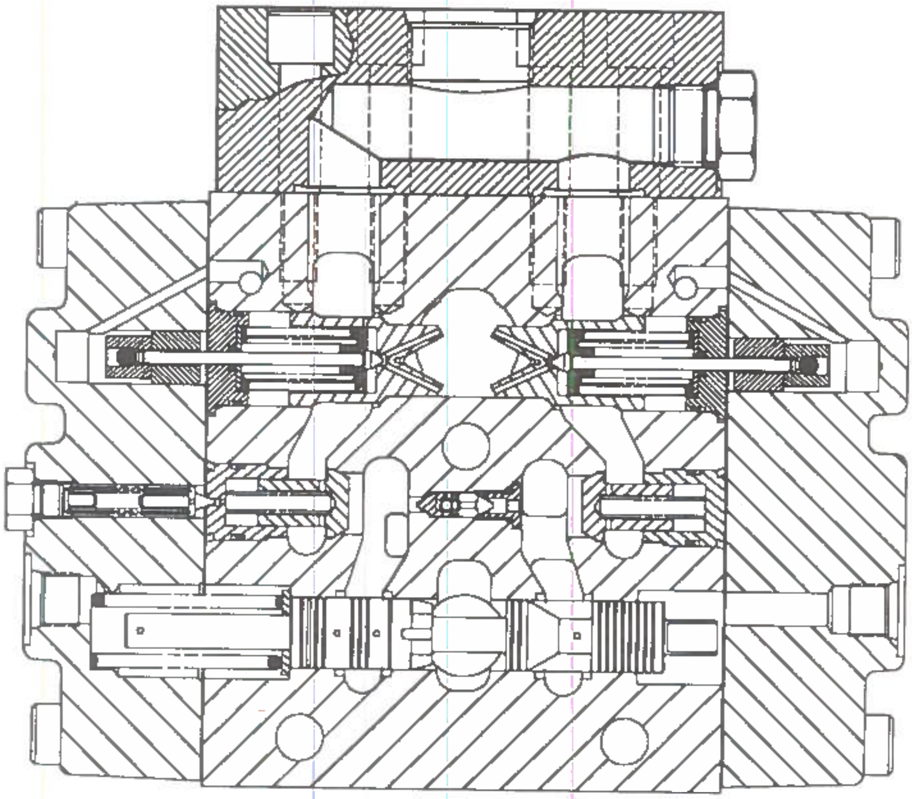
This option extends the flow range for the CMX valve on applications requiring only a three-way valve. The meter-in spool is spring biased to one end of its bore, and as it is piloted open, it ports fluid first to the "A" port then to both cylinder ports simultaneously. The meter-out poppets remain closed when lifting. For lowering, the meter-in spool remains closed.

For superior metering while lowering, different gain meter-out poppets can be selected.

Both actuator ports must be connected together externally by the user or by an optional bolt-on block. The optional bolt-on block is available only on the flange port sections. An option is available which uses only one meter-out poppet when a large meter-out flow area is not required.

The dual poppet meter-out version is not available for the electrohydraulic narrow body "S2" sections.

HIGH FLOW, SINGLE ACTING CMX



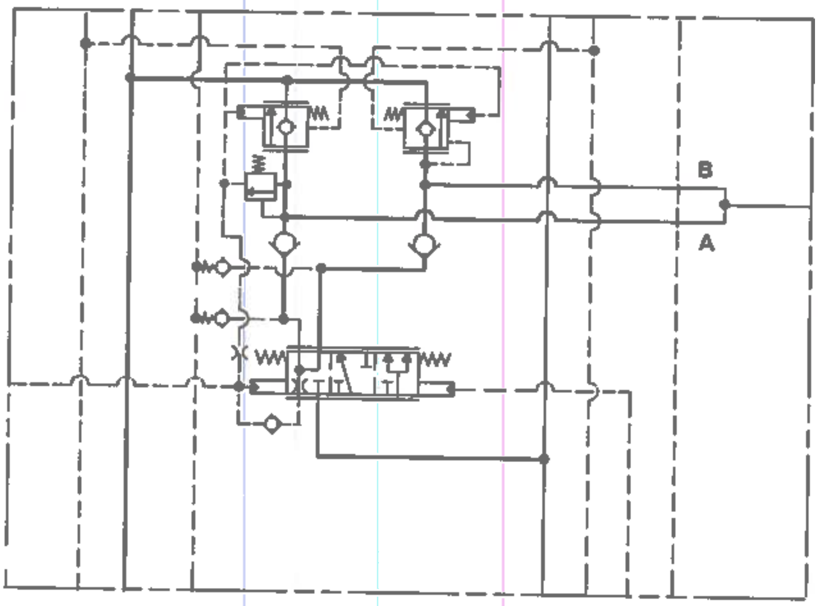


Figure 44

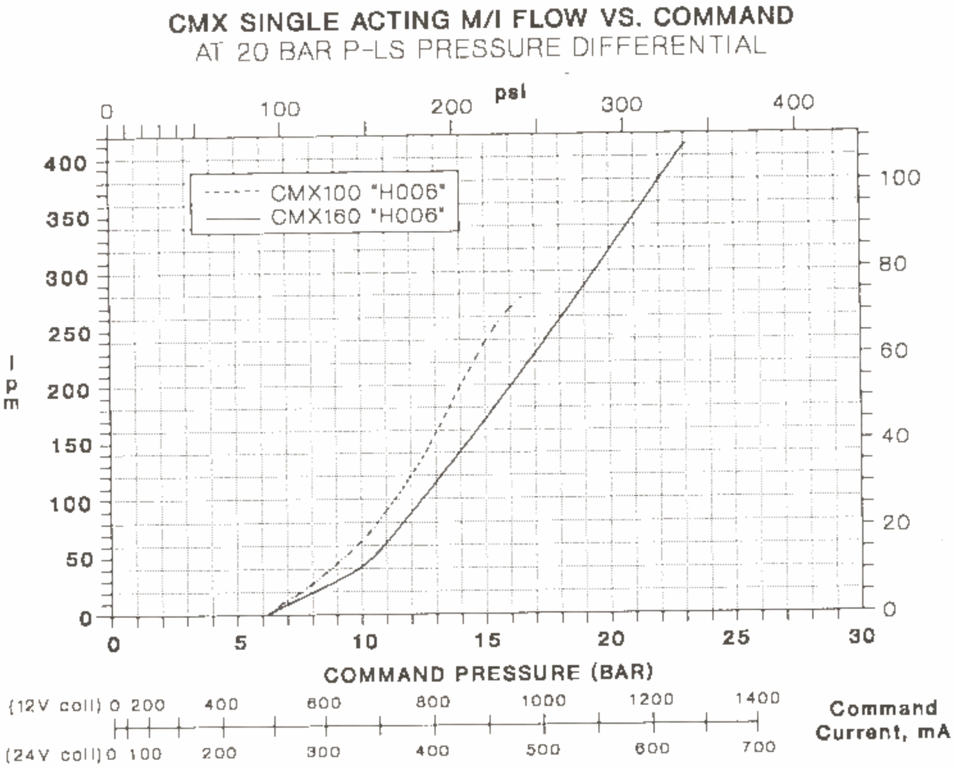


Figure 45a

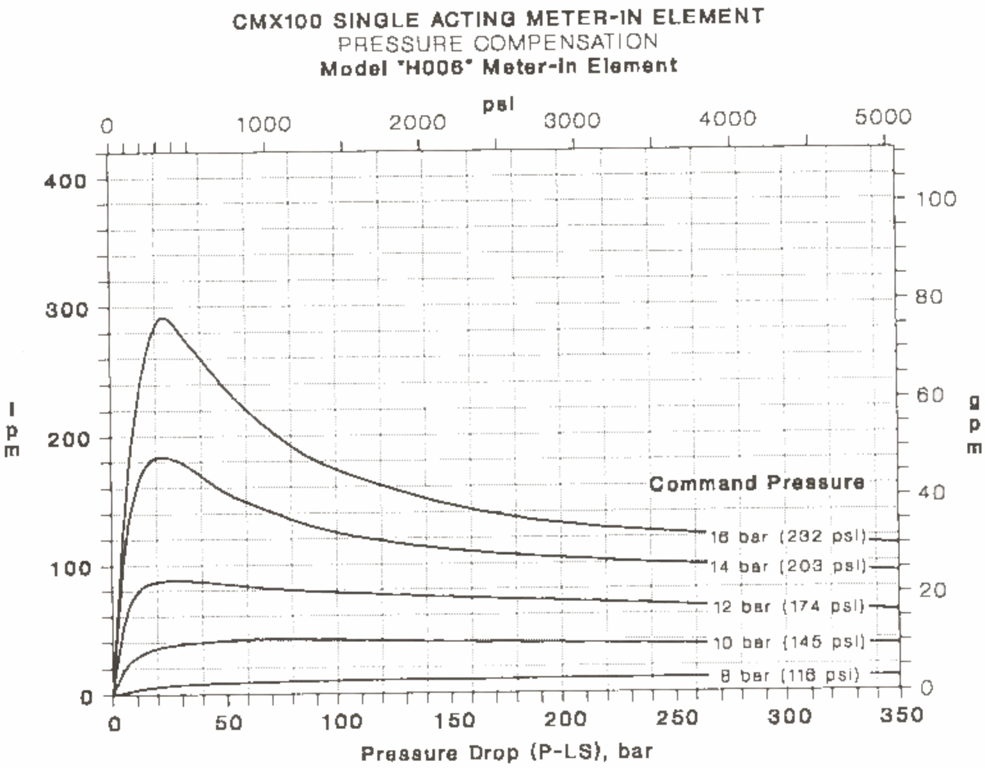


Figure 45b

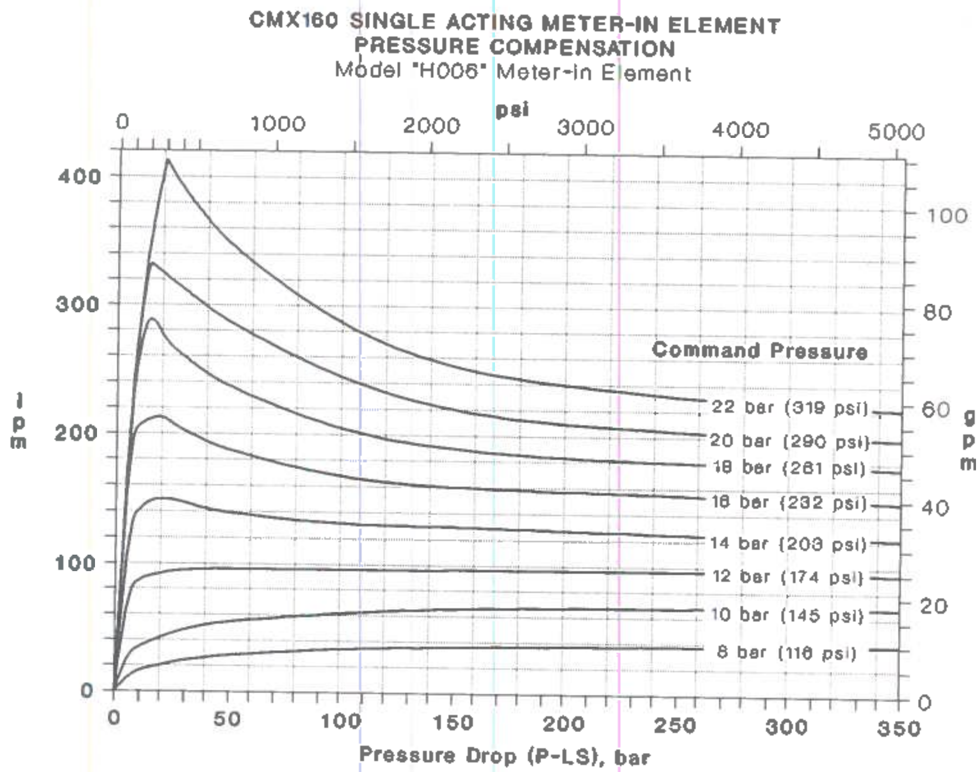

CMX160 SINGLE ACTING METER-IN ELEMENT
PRESSURE COMPENSATION
Model "H006" Meter-in Element
psi
0
1000
2000
3000
4000
5000
400
300
200
100
0
lpm
100
80
60
40
20
0
gpm
Command Pressure
22 bar (319 psi)
20 bar (290 psi)
18 bar (261 psi)
16 bar (232 psi)
14 bar (203 psi)
12 bar (174 psi)
10 bar (145 psi)
8 bar (116 psi)
0
50
100
150
200
250
300
350
Pressure Drop (P-LS), bar

Figure 45c

Swing drive with pressure controlled braking

This feature provides meter-in pressure control, proportional pressure controlled braking through the command pressure system, and blocked actuator ports in neutral. To achieve proportional braking, the meter-out element is operated only by a special relief valve pilot circuit (Figure 46). The relief valve setting is controlled by the command pressure, which is accomplished by a piston that is acted upon by command pressure to oppose the spring load on the relief valve pilot poppet. As the command pressure increases, the actuator port pressure required to open the relief valve poppet decreases, effectively decreasing the relief valve setting. Thus when driving a load, the relief valve setting is at a minimum, typically about 8 bar (116 psi). To brake the load, the pilot pressure is decreased, which increases the relief valve setting. The pilot pressure is decreased until the desired braking pressure is achieved.

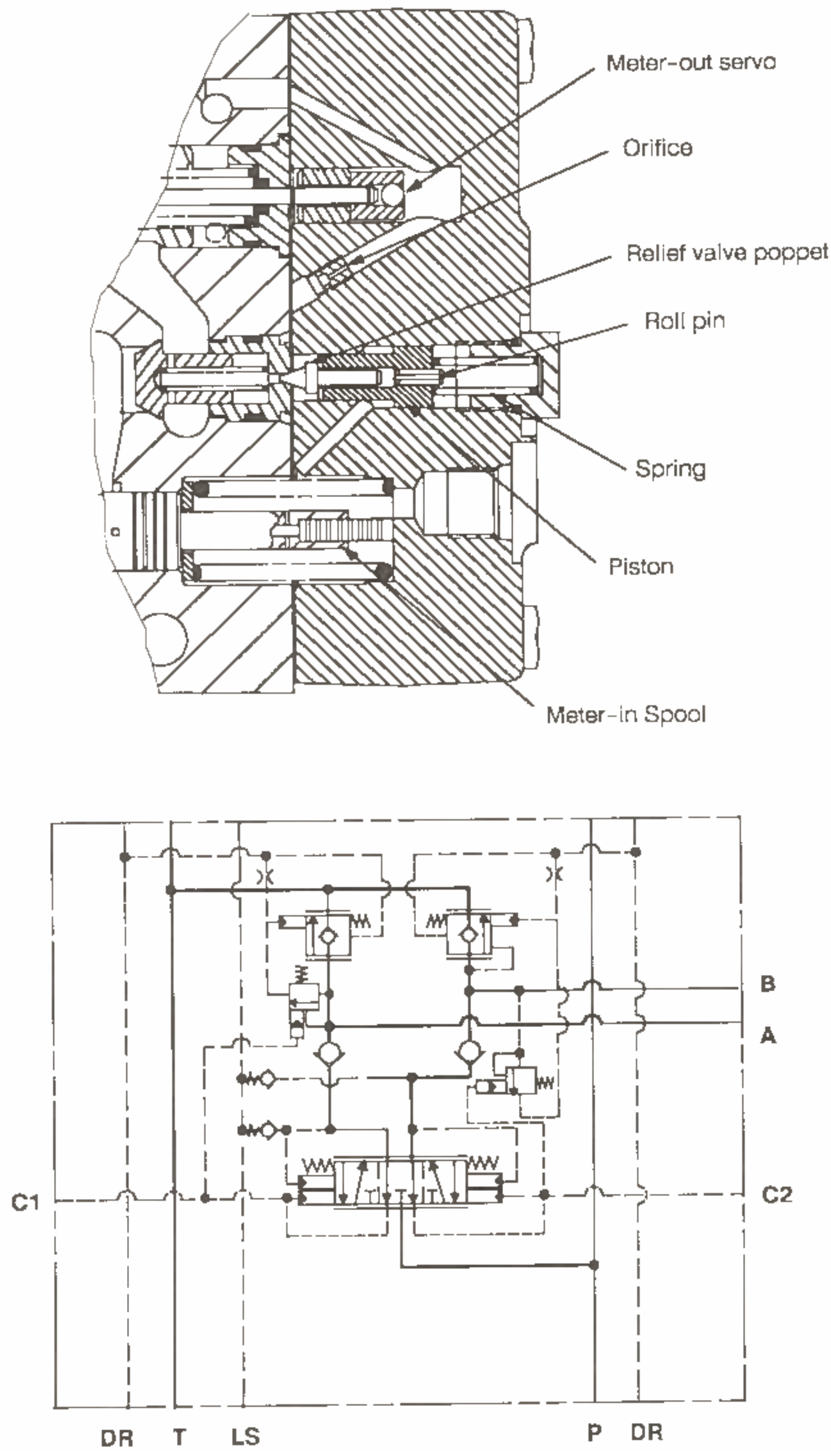


Figure 46

Performance characteristics of the meter-out pressure control valve can be plotted using Q-P diagrams. Figure 47a is the Q-P diagram for the CMX100 "S406" meter-in spool from page 18. Figure 47b is the Q-P (relief valve override) diagram of the "P03" relief valve for various command pressures and a relief valve setting of 208 bar. Combining these diagrams yields Figure 47c (See Figure 47e for CMX160 version). Note that the back pressure from the opposite actuator port relief valve has been subtracted from the constant-pilot-pressure lines, so the pressure scale is the pressure drop across the valve's actuator ports. Now, for a given flow and command pressure, the pressure available to drive or brake the load can be extracted. If an assumed steady state load curve is added (Figure 47d), the chart can be used to determine the required command pressure to drive the load at a given speed; or, the equivalent braking pressure (braking pressure plus the load curve) can be obtained.

To illustrate the operation of the valve, assume the load is at rest and the valve is in neutral. The figure shows a braking pressure of 185 bar at point A, which is the relief valve setting, and the pressure that must be imposed by an external load to move the load. As pilot pressure is applied, pressure begins to be applied to the actuator at point B. When the load pressure is overcome at point C, the load begins to move. If the pilot pressure is increased to 20 bar, the load will accelerate along the 20 bar pilot pressure line until the output pressure equals the steady-state load pressure at point E. Note that the pressure available to accelerate the load is the output pressure at any given flow and pilot pressure minus the steady state load pressure.

To slow or stop the load, the command pressure is reduced. If the command pressure is reduced to 16 bar (point F), the load will continue to be driven but at a pressure below the steady-state load curve. The load will slow along the 16 bar line until the steady state load curve is intersected at G point. If the command pressure is further reduced to 8 bar, the load will brake until the load stops. Here, the effective deceleration pressure at any given speed is the braking pressure plus the steady-state load pressure.

By modulating the command signal, the operator has complete proportional control of swing driving and braking pressures. This control provides smooth, precise control of high inertia swing drives.

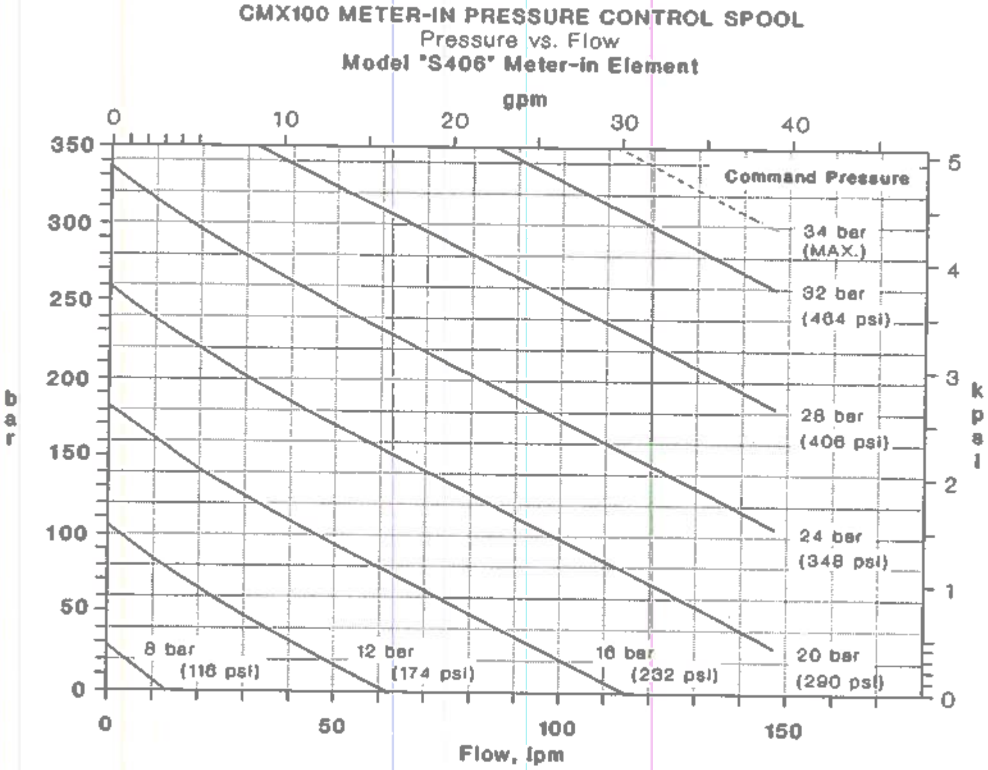


Figure 47a

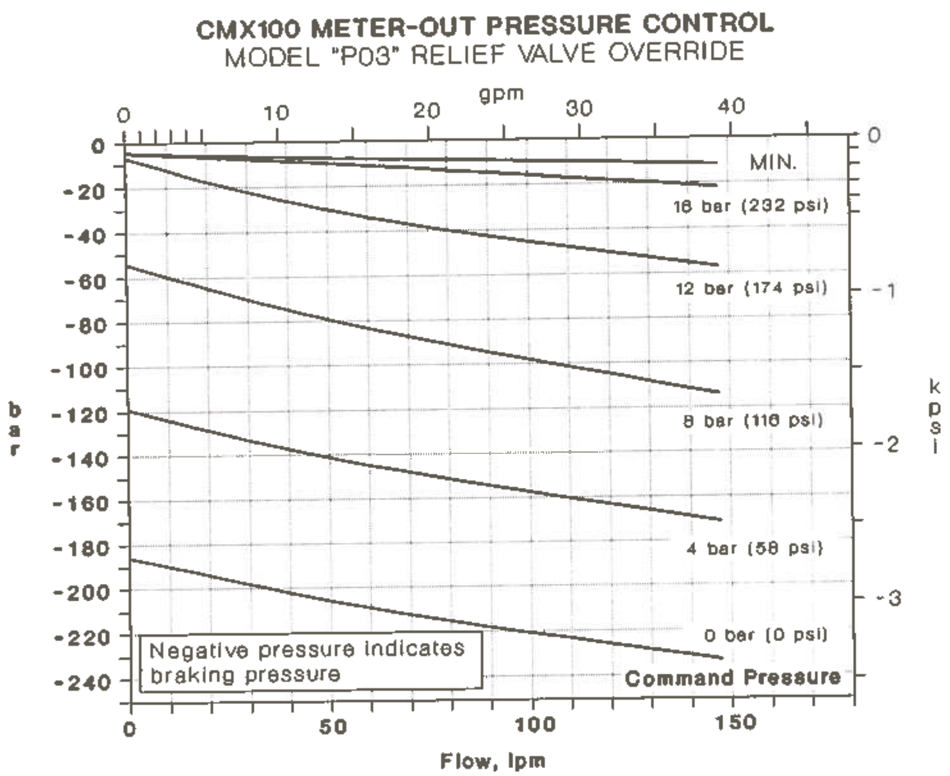

CMX100 METER-OUT PRESSURE CONTROL
MODEL "P03" RELIEF VALVE OVERRIDE
gpm
0
10
20
30
40
bar
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
-220
-240
kpsi
0
-1
-2
-3
MIN.
16 bar (232 psi)
12 bar (174 psi)
8 bar (116 psi)
4 bar (58 psi)
0 bar (0 psi)
Command Pressure
Negative pressure indicates braking pressure
0
50
100
150
Flow, lpm

Figure 47b

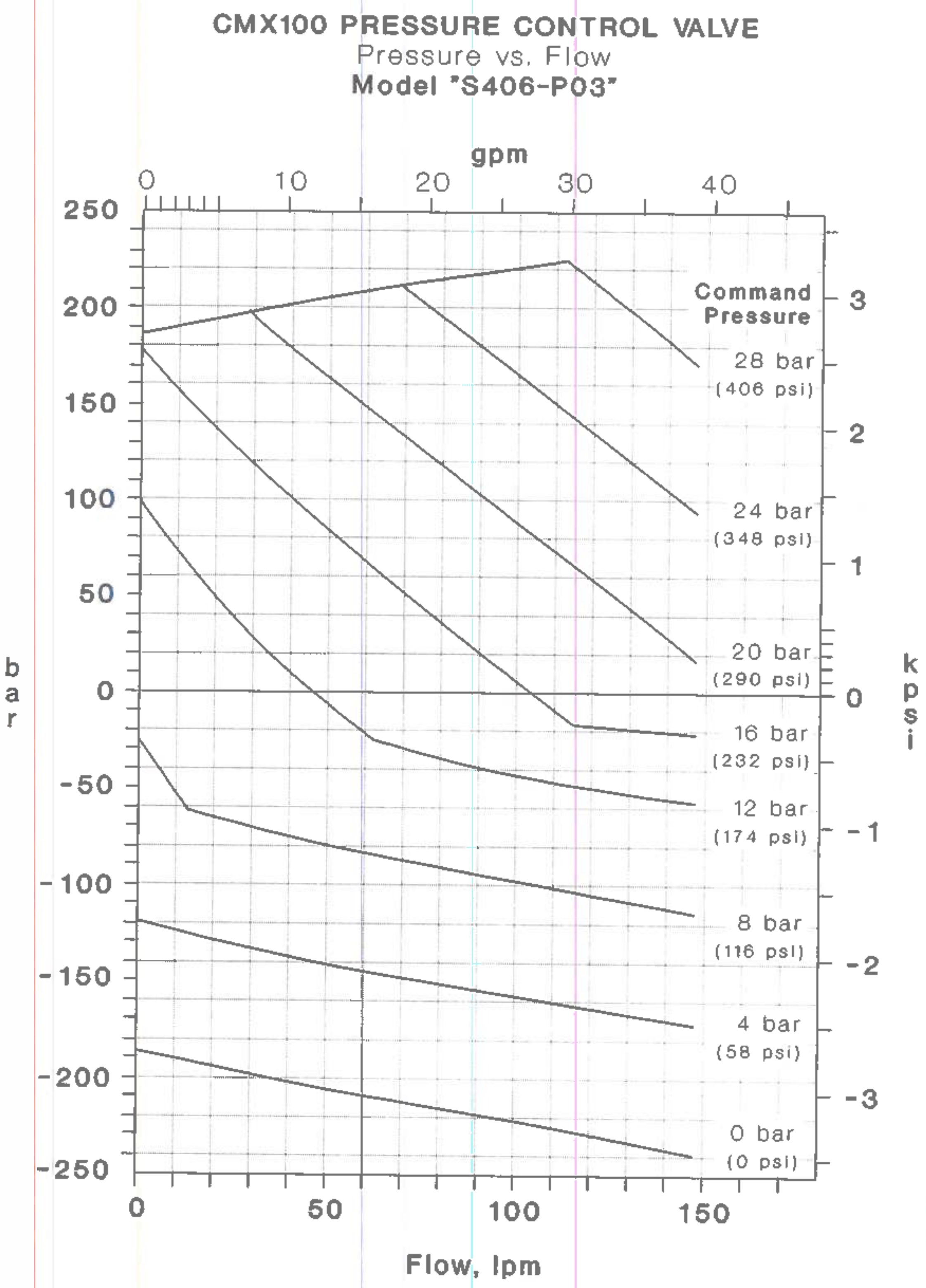
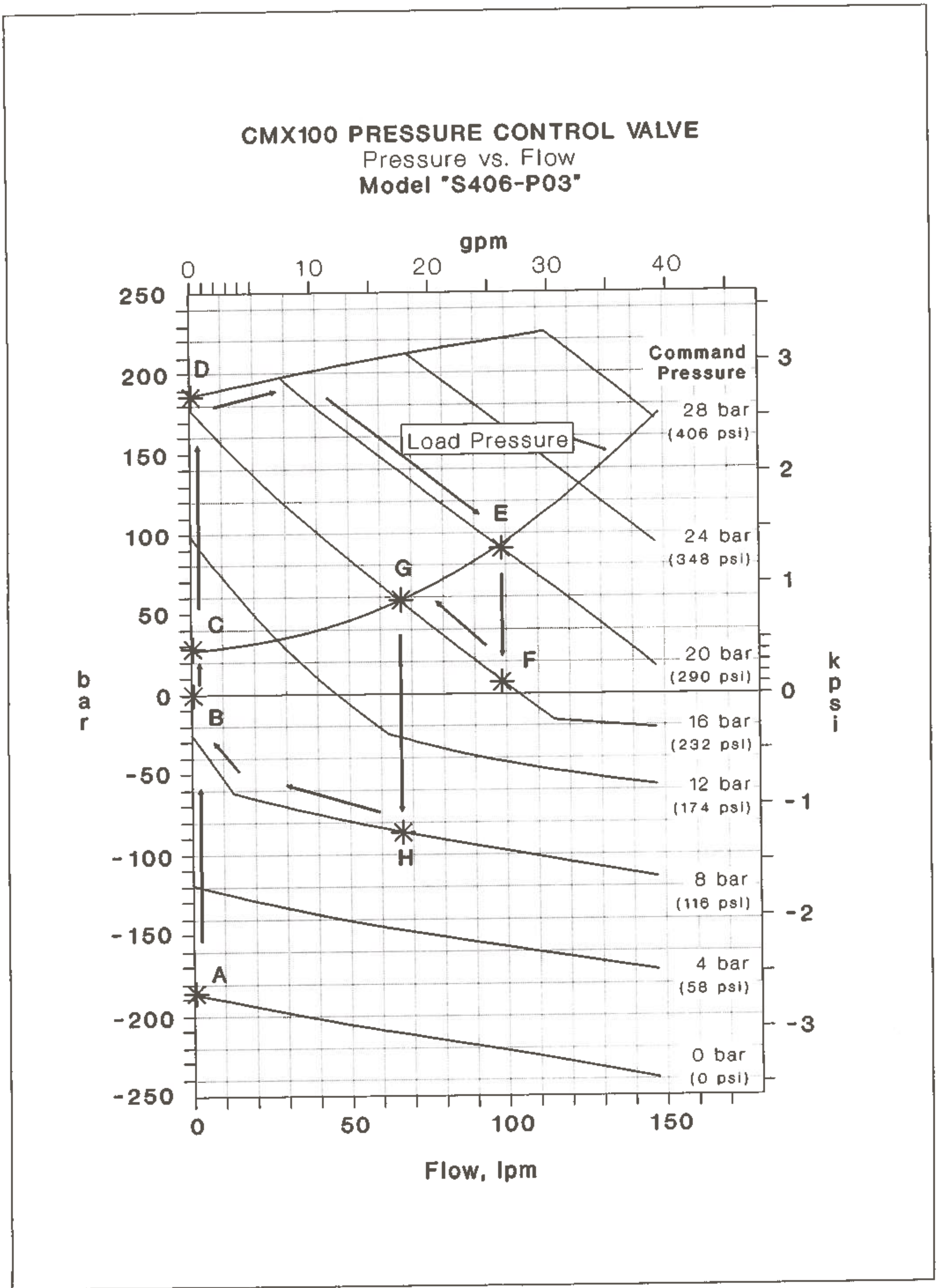
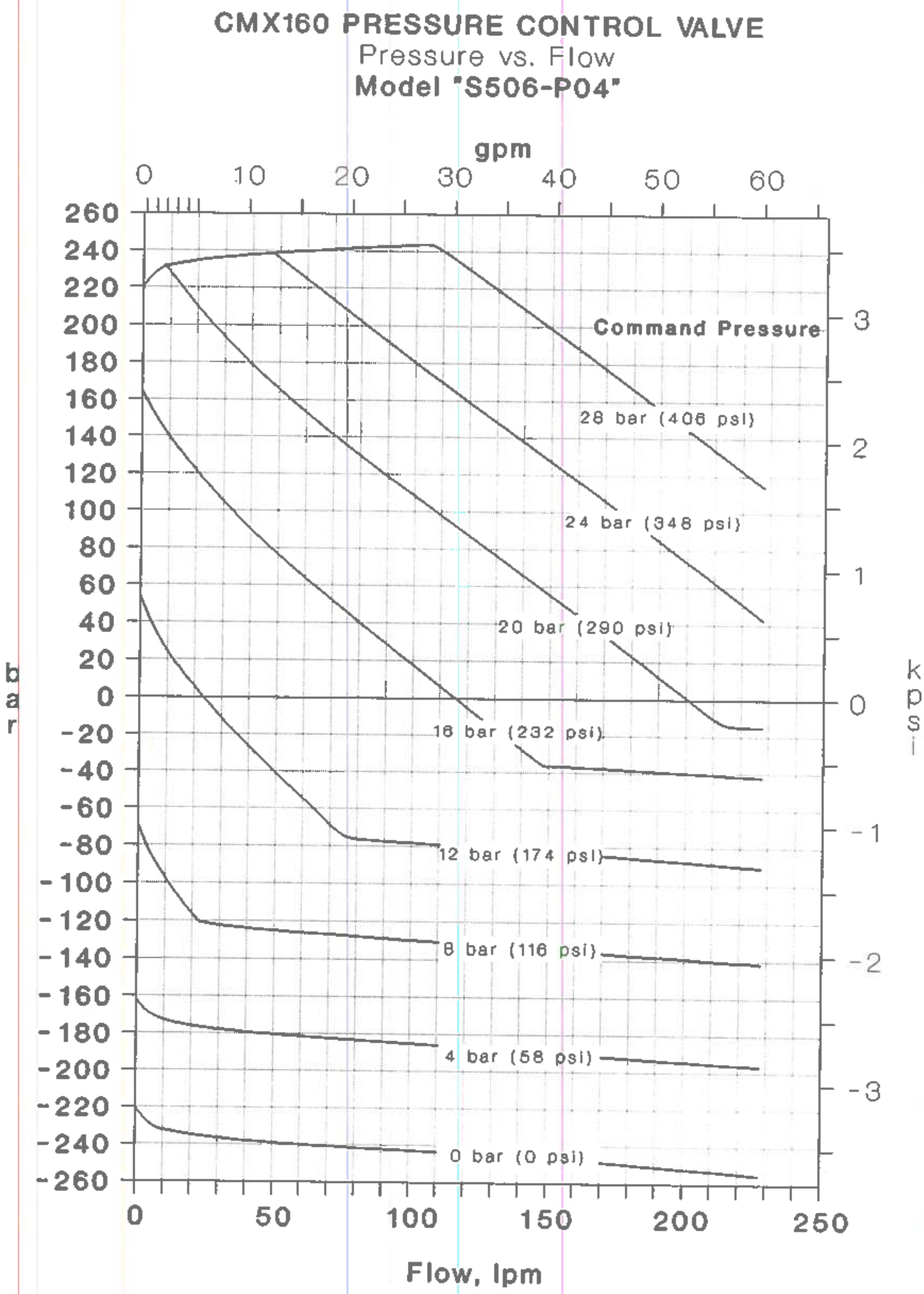

CMX100 PRESSURE CONTROL VALVE
Pressure vs. Flow
Model "S406-P03"
gpm
0
10
20
30
40
250
200
150
100
50
0
-50
-100
-150
-200
-250
bar
Command Pressure
28 bar (406 psi)
24 bar (348 psi)
20 bar (290 psi)
16 bar (232 psi)
12 bar (174 psi)
8 bar (116 psi)
4 bar (58 psi)
0 bar (0 psi)
3
2
1
0
-1
-2
-3
kpsi
0
50
100
150
Flow, lpm

Figure 47c



CMX100 PRESSURE CONTROL VALVE
Pressure vs. Flow
Model "S406-P03"
gpm
0
10
20
30
40
250
200
150
100
50
0
-50
-100
-150
-200
-250
b
a
r
Command
Pressure
28 bar
(406 psi)
24 bar
(348 psi)
20 bar
(290 psi)
16 bar
(232 psi)
12 bar
(174 psi)
8 bar
(116 psi)
4 bar
(58 psi)
0 bar
(0 psi)
3
2
1
0
-1
-2
-3
k
p
s
i
Load Pressure
A
B
C
D
E
F
G
H
0
50
100
150
Flow, lpm

Figure 47d



CMX160 PRESSURE CONTROL VALVE
Pressure vs. Flow
Model "S506-P04"
gpm
0
10
20
30
40
50
60
260
240
220
200
180
160
140
120
100
80
60
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
-220
-240
-260
bar
3
2
1
0
-1
-2
-3
kpsi
Command Pressure
28 bar (406 psi)
24 bar (348 psi)
20 bar (290 psi)
16 bar (232 psi)
12 bar (174 psi)
8 bar (116 psi)
4 bar (58 psi)
0 bar (0 psi)
0
50
100
150
200
250
Flow, lpm

Figure 47e

Free coast (type "F" meter-out)

This option provides a free coast or float operation in neutral. (Note: On a standard valve, float operation can be achieved by piloting both pilot pressure ports simultaneously). This is accomplished by a passage between the meter-out spring chamber and the corresponding meter-in chamber (Figure 48). In neutral, pressure in the meter-in chamber is low; thus, the meter-out spring chamber pressure is low, and the meter-out poppet will open when the relatively light spring force of the meter-out servo stem is overcome. During commanded operation, a check valve prevents flow from the meter-in chamber to the meter-out spring chamber. Single "F" meter-out models hold the load in one direction but not the other.The FA and FB models hold the load in one direction but not the other. Dual "F" meter-out models give a free coast or float feature in both directions.

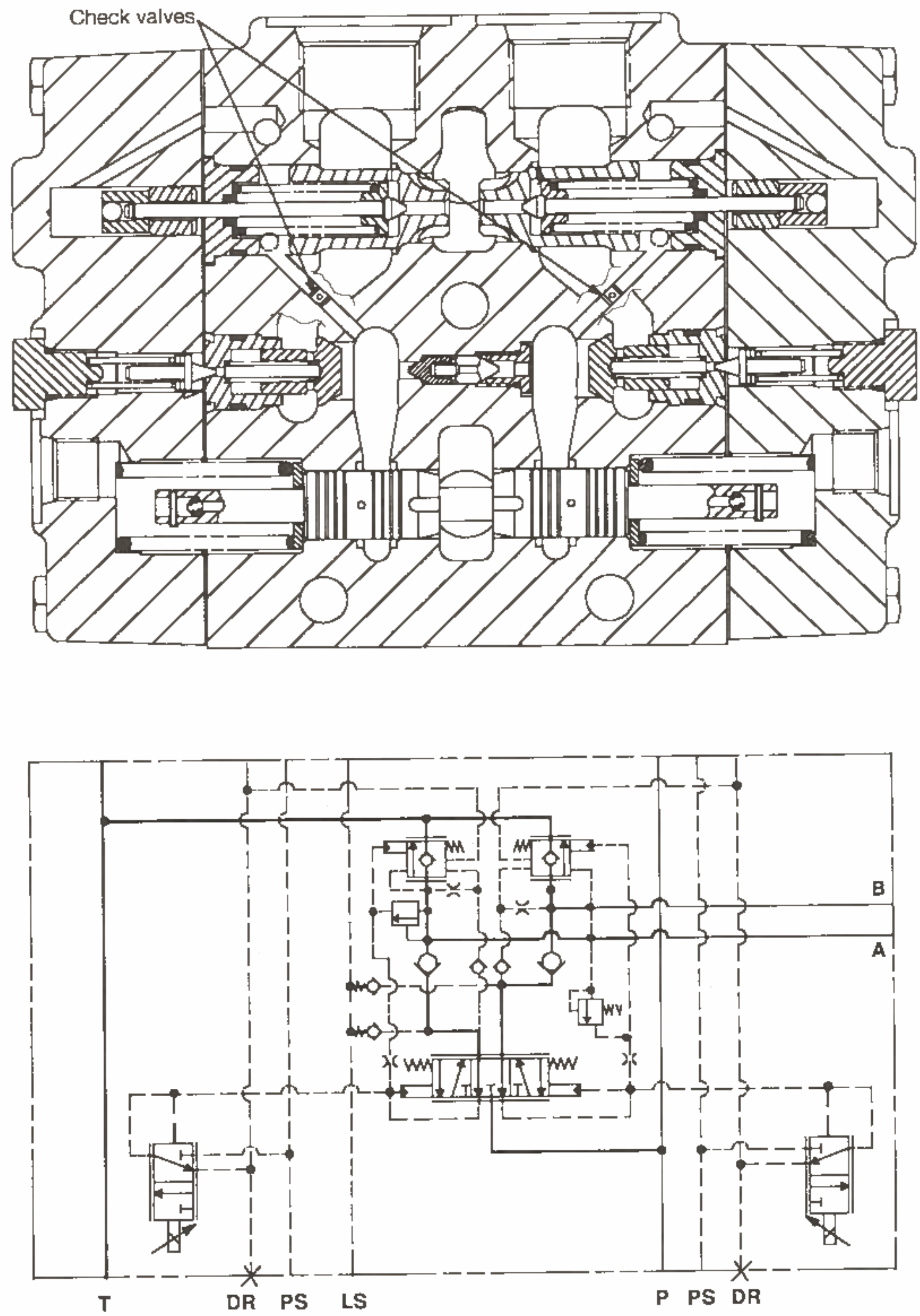


Figure 48

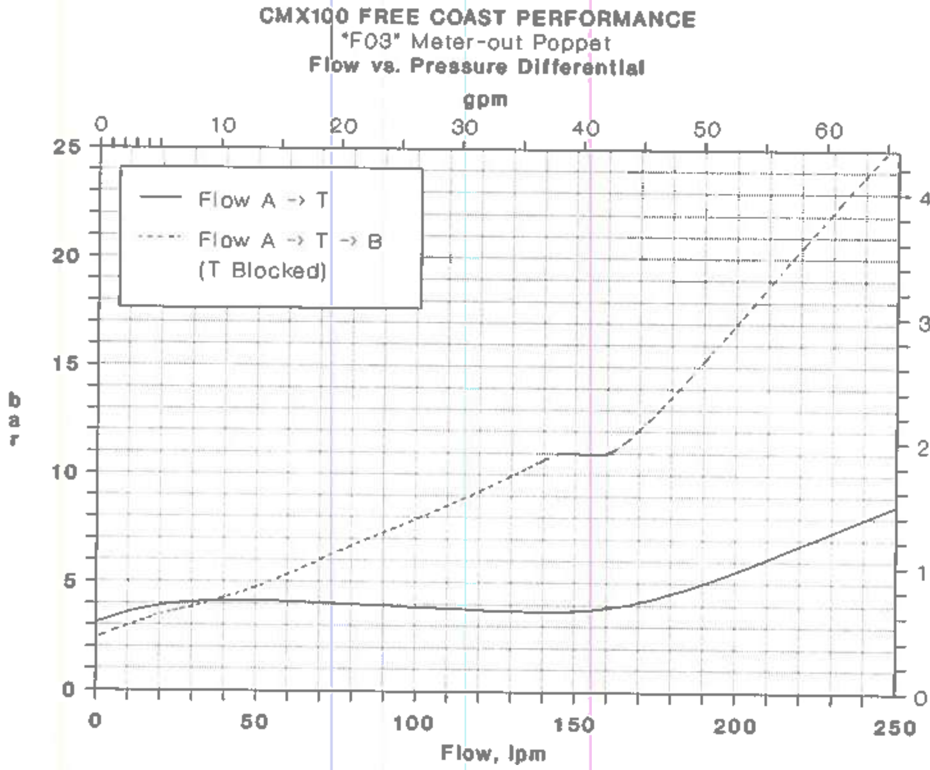


Figure 49

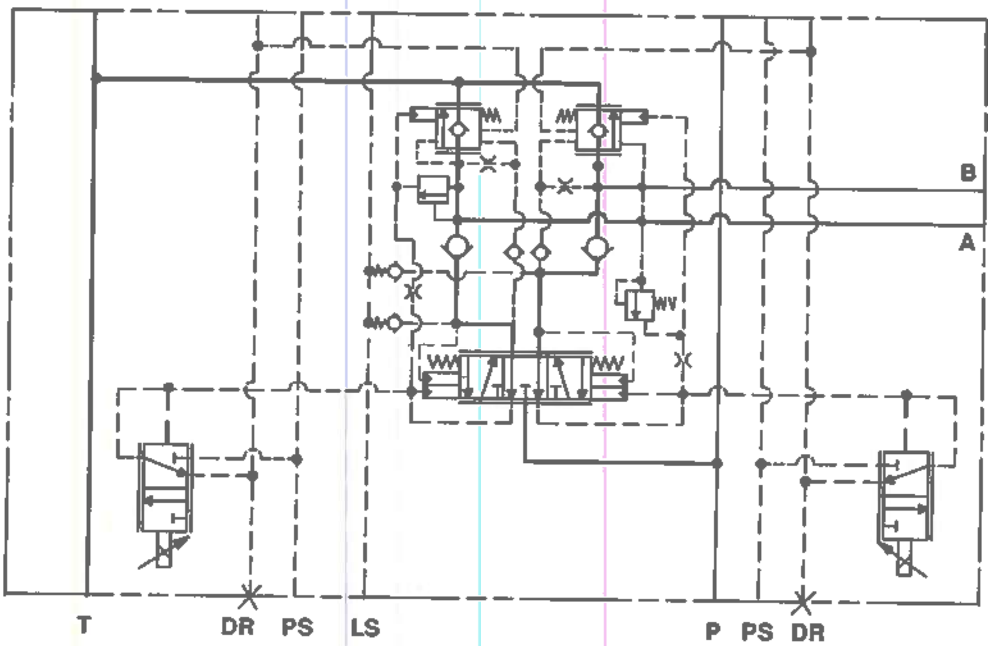


Figure 50. Swing Drive With Free Coast
(Utilizing meter-out poppets and a pressure controlling meter-in element.)

CMX Sectional Model Code

In the "A" port section: Meter-in, Meter-out — In the "B" port section: Meter-in, Meter-out — Body — Actuation — Connectors

CMX100 - S 2 - A S 0 12 S 03 C 28 - B S 0 12 S 03 C 28 - E - HH - SP2 - 24 - *

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

1 Mobile valve

Load sensing
Pressure compensated

2 Valve series

100 - 100 l/min
160 - 160 l/min

3 Port configuration

S - Thd. port SAE o-ring connection
F - Flanged port Code 62 SAE 4-bolt high pressure
FL - Flanged port Code 61 SAE 4-bolt standard pressure

4 Construction

2 - Sectional
3 - Sectional with module (requires F or FL ports)

5 Port designation "A"

6 Meter-in function

H - Single acting high flow
L - Low flow 0 – 40 l/min (11 USgpm)
S - Standard

Note: When meter-in spool drain orifice is required, add "D" to model code in this position.

6A P

Meter-in pressure limitation. Omit if not required.

7 Pressure feedback pin diameter

0 - No pin (Flow control)
2 - 2.0 mm
4 - 3.6 mm (Pressure control)
5 - 4.5 mm

8 Meter-in cracking pressure

06 - 6.3 bar
12 - 11.6 bar

9 Meter-out function

S - Standard
V - External vent
F - Free coast
P - Pressure control (must have external drain)

M - Meter-out spool - fully open to tank in neutral
N - Meter-out spool - restricted opening to tank in neutral

10 Meter-out element

(Δp at rated flow)

00 - Meter-out spool
03 - 3 bar CMX100 only
04 - 4 bar CMX160 only
07 - 7 bar CMX160 only
14 - 14 bar CMX100 & 160
56 - 56 bar CMX160 only
90 - 90 bar CMX100 only

11 Meter-out special features

(Omit if not rquired)

A - Anti-cavitation valve T → A
B - Anti-cavitation valve T → B
C - Anti-cavitation valve T → AB
H - High flow module A port
R - Regenerative module A → B
T - Regenerative module B → A

12 Meter-out pressure limitation

00 - Without pilot relief valve
10 - 38 - Consecutive numbers representing 100 bar (1450 psi) to 380 bar (5510 psi) in increments of 10 bar (150 psi), eg. 14 - 140 bar
99 - Externally adjustable relief

13 Port designation "B"

Repeat positions 6 through 12 for B port positions 14 through 20.

21 Actuation

E - Electrohydraulic
H - Hydraulic
(must have external drain)

22 Voltage

(Electrohydraulic only. Blank not required for hydraulic actuation)

G - 12 volts DC
H - 24 volts DC
HH - 28 volts DC

23 Electrical connectors

FL- Flying leads
SP2- Dual SAE 1/4" spade connector
U- DIN 43650 spade plug only
U1- DIN 43650 complete
MP - Metri-pack

24 Design number

25 Assembly number

Assigned by Engineering

Check with your local Vickers representative for availability of the features shown in italics.

CMX Sectional Valve Bank Model Code

CMX100 CMX160	-	P	E	-	SSS	-	CT	-	M	-	24	Ass'y number
1		2	3		4		5		6		7	8

1 Valve series

2 Inlet

Standard inlet

P -	CMX100 Standard	.750" SAE Straight thread
P -	CMX160 Stardard "S2"	1.000" SAE 4-bolt flange, Code 61
P1-	CMX160 Standard "F2"	.750" SAE 4-bolt flange, Code 62

Mid-inlet

MS*	CMX160/100 mid-inlet "S2"	1.250" SAE 4-bolt flange, Code 61
MF*	Mid-inlet "F2"	1.250" SAE 4-bolt flange, Code 62

M*1 Mid-inlet with pressure reducing valve. Omit if not rquired.

M*2 Mid-inlet with make up flow valve (anti-cavitation module). Omit if not required

M*3 Mid-inlet with pressure reducing and make up flow valve. Omit if not required

NOTE: When mid-inlet is required, add the mid-inlet designation at the appropriate place in the model code. Two end covers are required when a mid inlet is specified.

Load sense inlet

L -	CMX100 only Load sensing	.750" SAE straight thread

** - Load sensing pressure differential
10 bar
16 bar
26 bar

When unloading solenoid valve is required, add one of the following:
"G" 12 volt DC (flying leads only)
"H" 24 volt DC (flying leads only)

Note: Maximum limiting relief pressure: 210 bar.

Add "N" when unloading valve is not required.
** - Limiting relief pressure; 10 to 250 bar (Code 01 to 25)

Example: Unit with L/S inlet **L16G15**

3 External pilot supply

Omit if not required

4 Section

One required for each section, up to eight sections (Refer to sectional model code for description)

5 End cover

C -Cover with no L/S orifice (solid plug)
F - With fixed L/S orifice 0.5mm (0.020")
D -With load sense decompression valve

P - Auxiliary P port
T - Auxiliary T port
S - Auxiliary P and T ports

NOTE: Two end covers are required when mid-inlet is specified)

6 Mounting holes

M - Metric threads
Omit for inch threads.

Thread size inch
CMX100 - 3 holes .4375 - 14 UNC-2B
CMX160 - 3 holes .5000 - 13UNC-2B

Thread size metric
CMX100 - 3 holes M10 - 1.5
CMX160 - 3 holes M12 - 1.75

7 Design number

8 Assembly number

Assigned by Engineering

PORT SIZES					
Model	Pressure "P"	Tank "T"	Actuator "A" & "B"	Load Sense "LS"	Ext. Pilot "XP"
CMX100 "S2"	.750" SAE straight thread O-ring boss (1.063-12 UN-2B thd)	1.000" SAE straight thread O-ring boss (1.313-12 UN-2B thd)	1.062-12SAE straight thread O-ring	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
CMX100 "F2"	12.7 (.50) dia. SAE 4-bolt flange Code 62	19.0 (.75) dia. SAE 4-bolt flange Code 61	12.7 (.50) dia. SAE 4-bolt flange Code 62	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
CMX100 "FL2"	12.7 (.50) dia. SAE 4-bolt flange Code 61	19.0 (.75) dia. SAE 4-bolt flange Code 61	12.7 (.50) dia. SAE 4-bolt flange Code 61	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
CMX160 "S2"	1.000" SAE 4-bolt flange Code 61	1.250" SAE 4-bolt flange Code 61	1.312-12 SAE straight thd. O-ring	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
CMX160 "F2"	.750" SAE 4-bolt flange Code 62	1.250" SAE 4-bolt flange Code 61	19 (.75) dia. SAE 4-bolt flange Code 62	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
CMX160 "FL2"	.750" SAE 4-bolt flange Code 61	1.250" SAE 4-bolt flange Code 61	19 (.75) dia. SAE 4-bolt flange Code 61	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
CMX100 Load sensing relief valve	.750" SAE straight thread O-ring boss (1.063-12 UN-2B thd)	1.000" SAE straight thread O-ring boss (1.313-12 UN-2B thd)		.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
CMX160/CMX100 Mid-inlet "S2"	1.250" SAE 4-bolt flange Code 61	1.500" SAE 4-bolt flange Code 61		.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
Mid-inlet "F2"	1.250" SAE 4-bolt flange Code 62	1.500" SAE 4-bolt flange Code 61	1.250" SAE 4-bolt flange Code 62	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
CMX160/CMX100 Mid-inlet with pilot supply and anti-cav. makeup	1.000" SAE straight thread O-ring boss (1.313-12 UN-2B thd)	1.500" SAE straight thread O-ring boss (1.875-12 UN-2B thd)		.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)

Deceleration, external drain and cooling ports:
CMX100 and 160 valves .5625-18 SAE straight thread, "O" ring.

VICKERS®
A TRINOVA COMPANY

Overhaul Manual

Remote Flow Control Valves

FCGT-02-A-***-11-(S30)
FCGT-02-B-***-11-(S30)

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 12-1-85 I-3419-S

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A. PURPOSE OF MANUAL

This manual describes the basic operational characteristics and provides service, overhaul and parts information for the Vickers FCGT-02 Electrically Modulated Flow Control. The information contained herein pertains to the latest design series as listed in Table 2.

B. GENERAL INFORMATION

1. Related Publications - Installation dimensions are not contained in this manual. The installation drawing listed in Table 1 is available from any Vickers application engineering office or from:

Vickers, Incorporated
Technical Publications
1401 Crooks Road
Troy, MI 48084

2. Model Codes - Variations within each basic model series are covered in the model code. Table 2 is a complete breakdown of the codes covering these units. Service inquiries should always include the complete unit model code as noted on the nameplate.

Model	Drawing
FCGT-02-A-004-11	513850A
FCGT-02-B-004-11	
FCGT-02-A-028-11	
FCGT-02-B-028-11	
FCGT-02-A-220-11	
FCGT-02-B-220-11	
FCGT-02-A-530-11	
FCGT-02-B-530-11	

Table 1.

MODEL CODE BREAKDOWN

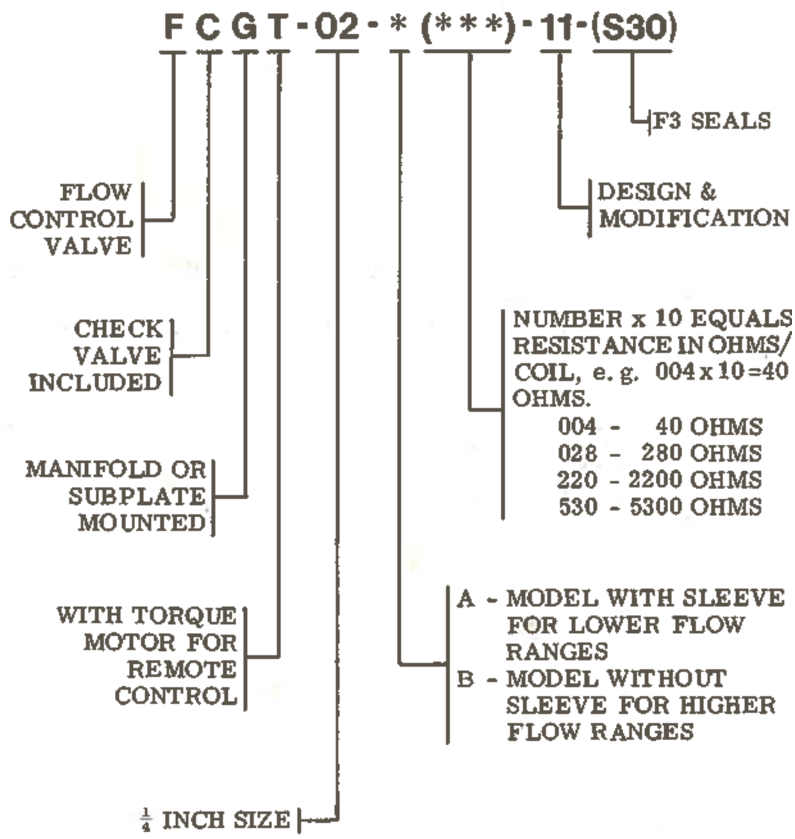


Table 2. Model Code Breakdown

Section II - DESCRIPTION

A. GENERAL.

Assembly of a typical FCGT Flow Control is shown in Figure 1. In general, the flow control consists of an electrical torque motor coupled to a metering spool. The metering spool and a compensated hydrostat stabilizes flow in the forward direction. A check valve is provided to allow reverse free flow through the valve.

FCGT flow controls are available in two flow ranges; 5 to 250 and 50 to 1000 cubic inches per minute, (in^3/minute). Flow ranges are determined by different metering spool diameters. The smaller the metering spool, the lower the flow range.

B. APPLICATION

Vickers application engineering personnel should be consulted to determine correct methods of installation and applications.

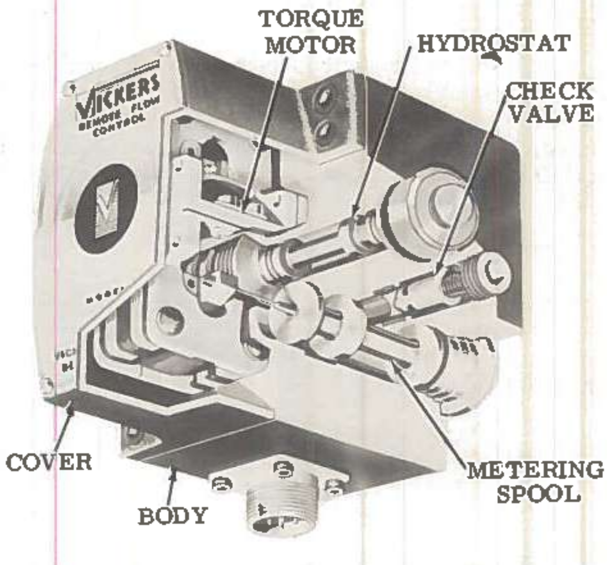


Figure 1. Cut Away View of FCGT-02-*-***-11

Section III - PRINCIPLES OF OPERATION

A. SPOOL ADJUSTMENT

The metering spool is adjusted at the factory for a minimum flow of 5 in^3/minute, ("A" Models), and 50 in^3/minute for "B" models.

B. THEORY OF OPERATION

Consider the FCGT Flow Control Valve as being two distinct and separate systems - one a standard compensated flow control with a fixed throttle setting and secondly an electrically modulated device (torque motor), used to vary the throttle opening. (Refer to the pictorial diagram Figure 2, during the following explanation.)

FLOW CONTROLS - Flow controls work on the principle that flow through an orifice will be constant when the pressure drop across the orifice is held constant. Flow (Q) through an orifice is directly proportional to the orifice area (A) and the square root of the pressure drop across it, ($\sqrt{\Delta P}$).

$Q = A\sqrt{\Delta P / 0.0325}$ Q=USGPM A = in^2
Valid for short orifice ΔP - PSI drop across orifice

Assume throttle orifice "A" (the metering spool orifice) is opened to allow 200 cubic inches/minute (in^3/minute), flow through the valve to an external load circuit. The external load circuit develops 1000 PSI. Inlet pressure to the valve is 2000 PSI.

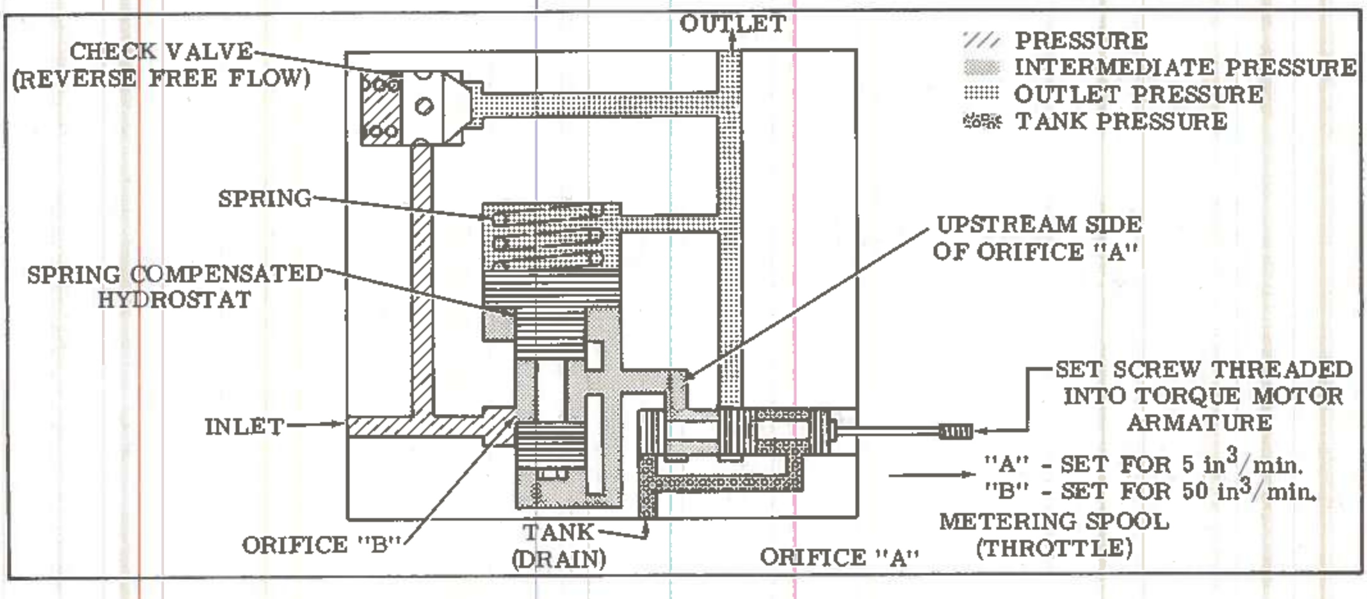


Figure 2. Pictorial Diagram

The total pressure drop across the valves two series orifices "A" and "B" must equal 1000 PSI, (the difference between inlet and outlet pressures). The normal drop across orifice "A" is between 60 and 80 PSI. (Use 75 PSI for this explanation.) Orifice "B" will drop 925 PSI, the total of the two pressure drops is the difference between inlet and outlet pressures.

If the work load increases, the outlet pressure increases. To keep a constant flow, the pressure drop across orifice "A" must not change. This is accomplished as follows:

The increased outlet pressure is sensed against the spring end of the hydrostat, causing it to move down, increasing the area of orifice "B" and reducing the pressure drop across it. This increases the pressure available at the up-stream side of orifice "A". 200 in^3/minute will continue to flow as long as a 75 PSI pressure drop is maintained across orifice "A".

If the work load were to decrease, (output PSI lower), a similiar set of events will begin, except in the opposite direction. The hydrostat will move up. Orifice "B" reduces in size, increasing the pressure drop across it, lowering the pressure at the up-stream side of orifice "A" and a constant 200 in^3/minute will continue to flow through the valve.

TORQUE MOTOR - A high force permanent magnet torque motor imparts linear motion to the torque motor armature. The deflection of the armature is directly proportional to current through the torque motor coils. This armature is linked to the metering spool with a wire and set screw. When current is applied to the torque motor coils, the armature is deflected to a certain position and the metering spool follows, opening or closing orifice "A". When orifice "A" changes, the flow control will vary flow through the valve and hold it constant at the new setting of the metering spool regardless of workload.

Section IV - Installation and Operating Instructions

A. INSTALLATION DRAWINGS

The installation drawing listed in table 1 will show installation dimensions and port locations.

B. MOUNTING

The FCGT-02-*-11 Flow Control Valve is designed for manifold or subplate mounting. Refer to the installation drawing for subplate dimensions.

C. PIPING AND TUBING

1. All pipes and tubing must be thoroughly cleaned before installation. Recommended methods of cleaning are sand blasting, wire brushing and pickling.

NOTE
For instructions on pickling, refer to instruction sheet 1221-S.

2. To minimize flow resistance and the possibility of leakage, only as many fittings and connections as are necessary for proper installation should be used.

3. The number of bends in tubing should be kept to a minimum to prevent excessive turbulence and friction of oil flow. Tubing must not be bent too sharply. The recommended radius for bends is three times the outside diameter of the tube.

D. HYDRAULIC FLUID RECOMMENDATIONS

Oil in a hydraulic system performs the dual function of lubrication and transmission of power. It constitutes a vital factor in a hydraulic system, and careful selection should be made with the assistance of a reputable supplier. Proper selection of oil assures satisfactory life and operation of system components with particular emphasis on hydraulic valves.

Data sheet I-286-S for oil selection is available from Vickers Technical Publications, Troy, MI. 48084.

Oil recommendations noted in the data sheet are based on our experience in industry as a hydraulic component manufacturer.

Where special considerations indicate a need to depart from the recommended oils or operating conditions, see your Vickers representative.

CLEANLINESS

Thorough precautions should always be observed to insure the hydraulic system is clean.

1. Clean (flush) entire new system to remove paint, metal chips, welding shot, etc.

2. Filter each change of oil to prevent introduction of contaminants into the system.

3. Provide continuous oil filtration to remove sludge, and products of wear and corrosion generated during the life of the system.

4. Provide continuous protection of system from entry of airborne contamination, by sealing the system and/or by proper filtration of the air.

5. During usage, proper oil filling and servicing of filters, breathers, reservoirs, etc., cannot be over emphasized.

6. Thorough precautions should be taken, by proper system and reservoir design, to insure that aeration of the oil will be kept to a minimum.

E. OVERLOAD PROTECTION

A relief valve is required to limit pressure in the system and to protect components from excessive pre-

ssure. The relief valve should be connected in the circuit at the outlet of the pump, before the FCGT flow control valve. The relief valve pressure setting should be adjusted just above the minimum work requirements of the system. DO NOT exceed the pressure rating of any system component or a malfunction may result.

Section V - Service and Maintenance

A. INSPECTION

Periodic inspection of the fluid condition and tube or piping connections can save time-consuming breakdowns and unnecessary parts replacement. The following should be checked regularly:

1. All hydraulic connections must be kept tight. A loose connection in a pressure line will permit the fluid to leak out. If the fluid level becomes so low as to uncover the inlet pipe opening in the reservoir, extensive damage to system components can result. In suction or return lines, loose connections permit air to be drawn into the system resulting in noisy and/or erratic operation.

2. Clean fluid is the best insurance for long service life. Therefore, the reservoir should be checked periodically for dirt or other contaminants.

If fluid becomes contaminated, the system should be drained and the reservoir cleaned before new fluid is added.

3. Air bubbles in the reservoir can ruin system components. If bubbles are seen, locate the source of the air and seal the leak.

B. ADDING FLUID TO THE SYSTEM

When hydraulic fluid is added to replenish the system, it should be pumped through a 10 micron (absolute) filter.

It is important that the fluid be clean and free of any substance which could cause improper operation or wear.

C. ADJUSTMENTS

See Test Procedure - Section VII.

D. LUBRICATION

Internal lubrication is provided by the fluid in the system.

E. REPLACEMENT PARTS

Reliable operation through the specified operating range is assured only if genuine Vickers parts are used. Sophisticated design processes and materials are used in the manufacture of our parts. Substitutions may result in early failure. Part numbers are shown in the parts listing - reference figure 3.

F. TROUBLE SHOOTING

Table 3 lists the common difficulties experienced with FCGT electrically modulated flow control valves. It also indicates probable causes and remedies for each of the troubles listed.

TROUBLE SHOOTING GUIDE		
TROUBLE	PROBABLE CAUSE	REMEDY
External Leakage	Back pressure in drain line and/or defective seals.	Drain directly to reservoir. Replace seals.
Stiction	Contamination and/or metering spool misalignment. Insufficient dither.	Clean valve. See alignment noted in test procedure Section VII.
Feed Rate Variations	Hydrostatic pressure compensator inoperative and/or sticking hydrostat.	Clean valve and flush system. Polish hydrostat and metering spool or replace with new parts.
Maximum Flow Not Obtainable	Contaminants in throttling orifice. Metering spool binding and not shifting fully or insufficient voltage to torque motor.	Clean valve. Check torque motor coils and input current. Realignment may be necessary. If this does not correct trouble, valve should be returned to Sperry Vickers for overhaul.
Check Valve Inoperative	Dirt lodged between mating faces, or finish faces scored.	Disassemble and flush thoroughly. Check filter element. Filter bypass may be open.

Table 3. Troubleshooting Chart

A. GENERAL

CAUTION

Before breaking a circuit connection, make certain that power is off and system pressure has been released. Lower all vertical cylinders, discharge accumulators, and block any load whose movement could generate pressure.

Drain oil from the hydraulic system. Use new, clean, filtered oil when restoring the unit to service. Clean the outside of the unit thoroughly to prevent entry of dirt into the system. After removing the valve and before disassembly, cap or plug all ports and disconnected hydraulic lines.

CAUTION

Absolute cleanliness is essential when working on a hydraulic system. Always work in a clean area. The presence of dirt and foreign materials in the system can result in serious damage or inadequate operation.

B. SPECIAL TOOLS

The following special tools are required:

1. Test stand mounting plate model FGTM-02-10 subplate and one BKFCGT-02-644 bolt kit.

2. Power supply rated at: Input 115 AC 50/60 Hz, Output 0-300 DC mA. Vickers EMCS-P-30 power supply part number 631995.

3. Milliammeter rated at 0-500 mA.

4. Test stand capable of providing the required hydraulic flow. See figure 6 located in Section VII, Test Procedure.

5. Pencil type solder iron and rosin core solder.

6. Volt - Ohm meter (VOM).

7. 5 inch "C" clamp.

C. IMPROVISED TOOLS.

No improvised tools are required for overhaul.

D. DISASSEMBLY.

Periodic maintenance of the valve will generally not require disassembly to the extent described here. However, the sequence can also be used as a guide for partial disassembly. In general, disassembly is accomplished in the item number sequence shown in figure 3. Special procedures are included in the following steps:

NOTE

Discard and replace all "O" rings removed during disassembly.

1. Prepare a clean lint free surface on which to lay internal parts of the valve.

2. Remove and discard "O" rings (1) and (2).

3. Remove four screws (3) from the electrical connector (4) and allow the connector to hang down on its wires.

4. Symbolize each wire with a piece of tape to allow reassembly to the same pin of the connector. Unsolder the four wires from connector (4). Remove connector and gasket (5).

NOTE

Hold the valve over a container during the following step. The cover is full of system fluid that can leak out during cover removal.

5. Remove four screws (6) and cover (7). This exposes torque motor assembly (10). Use a 0.05 inch hex key to thread metering spool adjustment screw from the torque motor armature nut.

6. Remove four screws (8) and washers (9) from torque motor assembly (10) and remove torque motor from valve body (30). Set the torque motor on the clean prepared surface. Remove metering spool (12) from body (30). Be careful not to stress or bend the wire. Lift spacer (11) and gasket (13) from valve. Discard gasket.

NOTE

Parts (14) and (15) are used only on FCGT-02-A-***-11 models. Do not remove from body of valve at this time.

7. Apply pressure to center of retainer (17) with a "C" clamp and remove snap ring (16) with a sharp screwdriver.

8. Remove parts (17) through (20) from valve body (30).

9. Apply pressure to center of retainer (22) and remove snap ring (21) with a sharp screwdriver.

10. Remove retainer (22) then separate "O" ring (23) from retainer. Discard "O" ring.

11. Remove parts (24) through (26). DO NOT remove seat (27) at this time.

E. INSPECTION, REPAIR, AND REPLACEMENT.

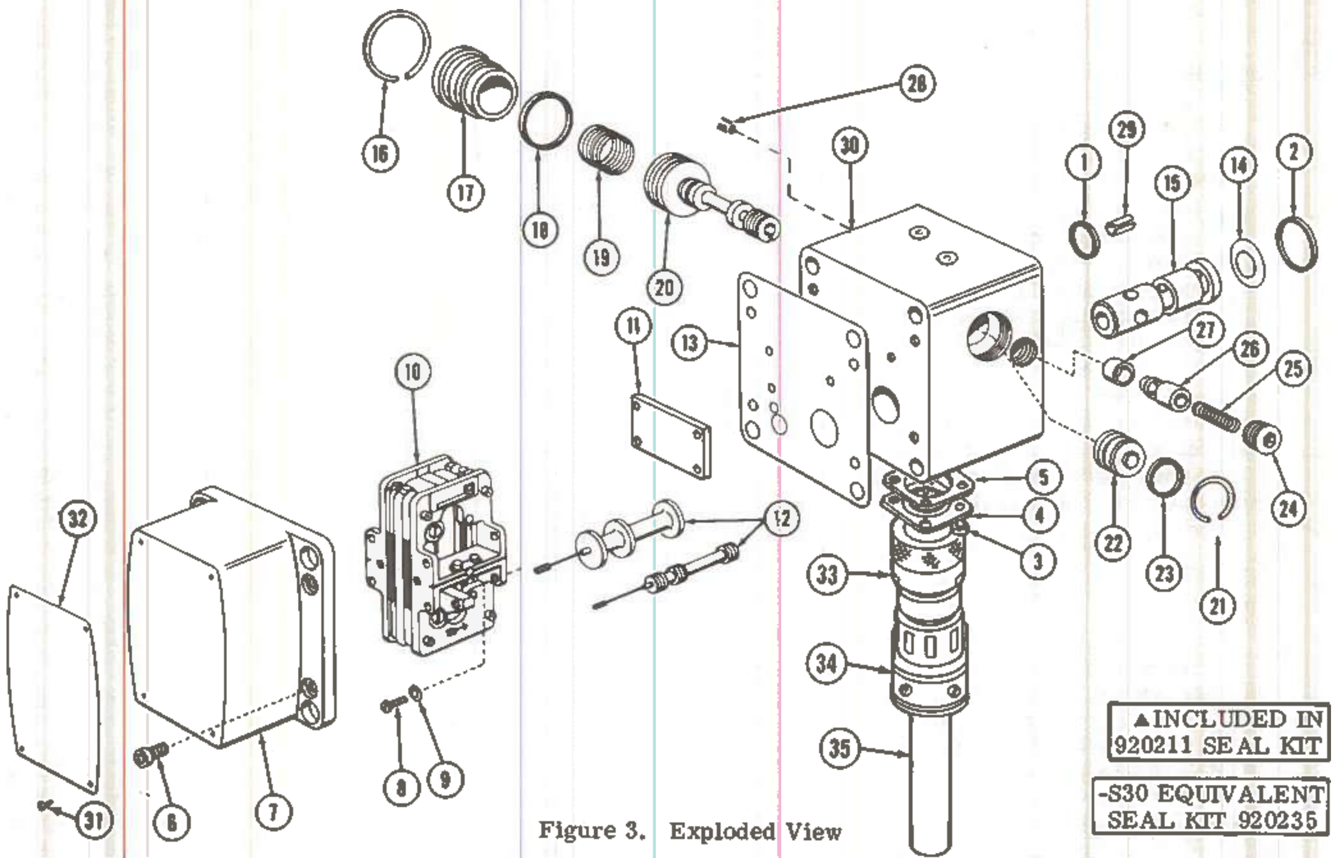


Figure 3. Exploded View

DESCRIPTION	SOURCE CODE
FCGT-02-A-004-11-(S30)	A
FCGT-02-A-028-11-(S30)	B
FCGT-02-A-220-11-(S30)	C
FCGT-02-A-530-11-(S30)	D
FCGT-02-B-004-11-(S30)	E
FCGT-02-B-028-11-(S30)	F
FCGT-02-B-220-11-(S30)	G
FCGT-02-B-530-11-(S30)	H

NOTE

When Usable On Code is blank, the part is used on all models tabulated in source code. When Usable on codes are listed, use with indicated models only.

INDEX NO.	PART NUMBER	DESCRIPTION	Qty	Use on CODE
1	▲154011	"O" Ring	2	
2	▲166772	"O" Ring	1	
3	179263	Screw	4	
4	243233	Elect. Connector	1	
5	▲235068	Gasket	1	
6	7889	Screw	4	
7	234484	Cover	1	
8	125792	Screw	4	
9	176021	Lockwasher	4	
10	207961	Torque Mtr. (280 Ohms)	1	BF
	207692	Torque Mtr. (2200 Ohms)	1	CG
	211458	Torque Mtr. (5300 Ohms)	1	DH
	212619	Torque Mtr. (40 Ohms)	1	AE
11	234483	Spacer	1	
12	234485	Spool, Wire & Screw S/A	1	EFGH
	238129	Spool, Wire & Screw S/A	1	ABCD
13	▲234478	Gasket	1	
14	192435	Washer	1	ABCD
15	238127	Sleeve	1	ABCD
16	233625	Retaining Ring	1	
17	234939	Retainer	1	
18	▲166772	"O" Ring	1	
19	234964	Spring	1	
20	224342	Hydrostat	1	
21	312382	Retaining Ring	1	
22	317922	Retainer	1	
23	▲153950	"O" Ring	1	
24	7076	Plug	1	
25	95633	Spring	1	
26	79795	Check Valve	1	
27	239034	Seat	1	
28	7074	Plug (Aux. Drain Port)	1	
29	160571	Pin	1	
30	328055	Body	1	
31	93489	Screw	4	
32	247278	Nameplate	1	
33	242123	Connector	1	
34	126058	Clamp	1	
35	595310	Adapter	1	

NOTE

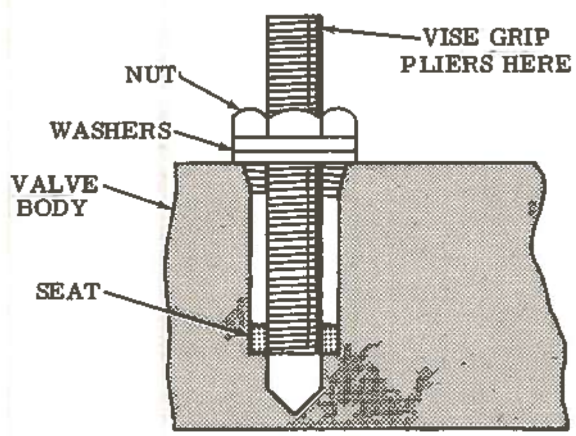
All parts must be thoroughly cleaned and kept clean during inspection and assembly. The close tolerance of the parts makes this requirement very important. Clean all removed parts, using a commercial solvent that is compatible with the system fluid. Compressed air may be used in cleaning, but it must be filtered to remove water and contamination. Clean compressed air is particularly useful in cleaning the spool and body passages. Replace all parts that do not meet the following specifications.

1. Inspect all components for excessive wear, erosion and/or seizure.

2. Inspect torque motor (10) for contamination (Ferrous wear particles binding the armature). Inspect torque motor coils for continuity (use the volt-ohm meter). Replace the torque motor if contaminated, or coils are open. DO NOT attempt repair of the torque motor.

3. Inspect metering spool (12) and hydrostat (20) for excessive wear, galling, erosion, and burrs. Remove burrs with an India stone. If either of the spools are defective, check body (30) bores for similiar defects. Replace defective parts.

4. Inspect check valve (26) for excessive wear, erosion and burrs. The seat contact area of the valve should have a bright circular contact area. Leakage paths across the check valve will show up as a break in the bright circular area. Erosion of the seat area may also cause a leakage path to develop. If seat (27) requires removal, tap seat with an appropriate thread, then install a length of threaded drill rod into the seat. Remove seat from the valve body. See figure 4.



Thread seat with a suitable tap, then install a length of threaded drill rod into the seat. Install washers and nut, then hold the top of drill rod with vise grip pliers. Pull seat from the valve by turning nut clockwise.

Figure 4. Removal of Seat

5. Inspect springs (19) and (25) for excessive wear and damaged coils. Replace springs if coils are damaged. Inspect springs for distortion. The ends of each spring must be parallel to each other. Replace springs if distorted.

6. Inspect body (30) for burrs, nicks, plugged passages and porosity. If either the metering spool, hydrostat or check valve are to be replaced, throughly inspect the bore from which the part was removed for defects. If the metering spool requires replacement, and the unit is a FCGT-02-A-11, remove and replace bushing (15) before installation of the new spool. Clean up bushing with an India stone before the spool is installed to remove the possibility of the existance of burrs. Burrs can prevent the bushing from entering the body and/or the metering spool from moving free within the sleeve. A very close slip fit exists between the body and sleeve, (0.0009 - 0.0012 inch). DO NOT force at assembly. If a problem exists, cool the sleeve before installation into the body. This reduces the diameter of the sleeve and will facilitate installation.

7. Inspect electrical connector (4) for solder splashes between pins, cross threads and broken pins. Replace if defective.

F. ASSEMBLY.

Replace the gaskets and "O" rings removed from the unit with those supplied in the seal kit. Lubricate "O" rings and parts using clean system fluid to facilitate assembly. Assemble parts in the reverse numerical sequence. Special procedures are included in the following steps: (See figure 3).

1. If nameplate (32) was removed, install a new nameplate with four screws (31).

2. Install parts (29) through (24) into body (30). If seat (27) or check valve (26) were defective, replace the check valve and seat as follows:

a. Press a new seat into the body (chamfer end of O.D. inward). Press seat in until it bottoms against the shoulder. Clean bore before installation of check valve to remove debris left from the seat installation.

b. Install a new check valve (26). The new check valve must be seated (matched to the seat) to prevent leakage. To seat a valve, first install valve into body without the spring. Insert a brass rod (smaller than the spring) behind the valve. Give the rod a sharp tap with a small hammer. This will seat the valve within the body. Remove the brass rod and valve. You will notice a circular pattern at the seat contact area of the valve. This pattern must not be broken or the valve will leak when put into service. Repeat the seating operation if required. Lubricate and assemble valve (26), then install spring (25) and plug together. Torque plug to 80 ± 5 lb. in.

NOTE

In the following step, hydrostat (20) must be installed with notch in small end parallel to mounting face of valve and pointing toward the electrical connector side of the valve body.

2. Install parts (23) through (16). Be careful not to cut "O" Rings during installation. Press plug (17) fully in with a large "C" clamp. This will facilitate assembly of retaining ring (16).

3. Position body (30) with mounting face down on the workbench. Lay gasket (13) and spacer (11) in position on the body. Lubricate and install metering spool (12) into body (30).

4. Position torque motor (10) against body (30), (wires to be located in wiring hole of body). Thread four screws (8) with lockwashers (9) through torque motor, spacer and gasket into body. DO NOT secure screws at this time.

5. Position torque motor armature above the metering spool adjustment screw. With a 0.05 inch hex head tool, thread the adjustment screw into the torque motor armature nut. (Alignment of the metering spool will be required along with the alignment of the torque motor during test.)

Pull the symbolized wires through the electrical connector opening as far as possible. If the torque motor was replaced, check the symbolization on the old motor to determine correct electrical connections. Refer to Table 4 and figure 5 if no connection information is available. Figure 5 will also help you determine the correct wiring for the different types of control systems used with torque motors. Table 5 defines the input current required for a maximum armature deflection of 0.020 inch.

Torque Motor Coil Location	Color Code Versus Connector Pin	
	Red	Coded
COIL "A"	A	B
COIL "B" Coil located next to the armature connection nut	D	C

Table 4. Coil location and wiring code to male electrical connector (Item 4, figure 3).

6. Remove a ¼ inch of insulation from the ends of the wires, then install a short piece of spaghetti sleeving over each wire end and slide back on the wire. Position the wire ends up and slide a new gasket (5) over the wires. Tin each wire end with solder, then insert wires one at a time into the proper pin of connector (4) and solder. Slide the sleeving over the pin after solder has cooled.

Coil Resistance, Ohms/Wire Code	Series Aiding	Parallel	Differential
40 /Yellow	150 ma	300 ma	———
280 /White	50 ma	100 ma	100 ma
2200 /Blue	20 ma	40 ma	40 ma
5300 /Black	12.5 ma	25 ma	25 ma

Table 5. Input Current required for max. armature deflection of 0.020 inch.

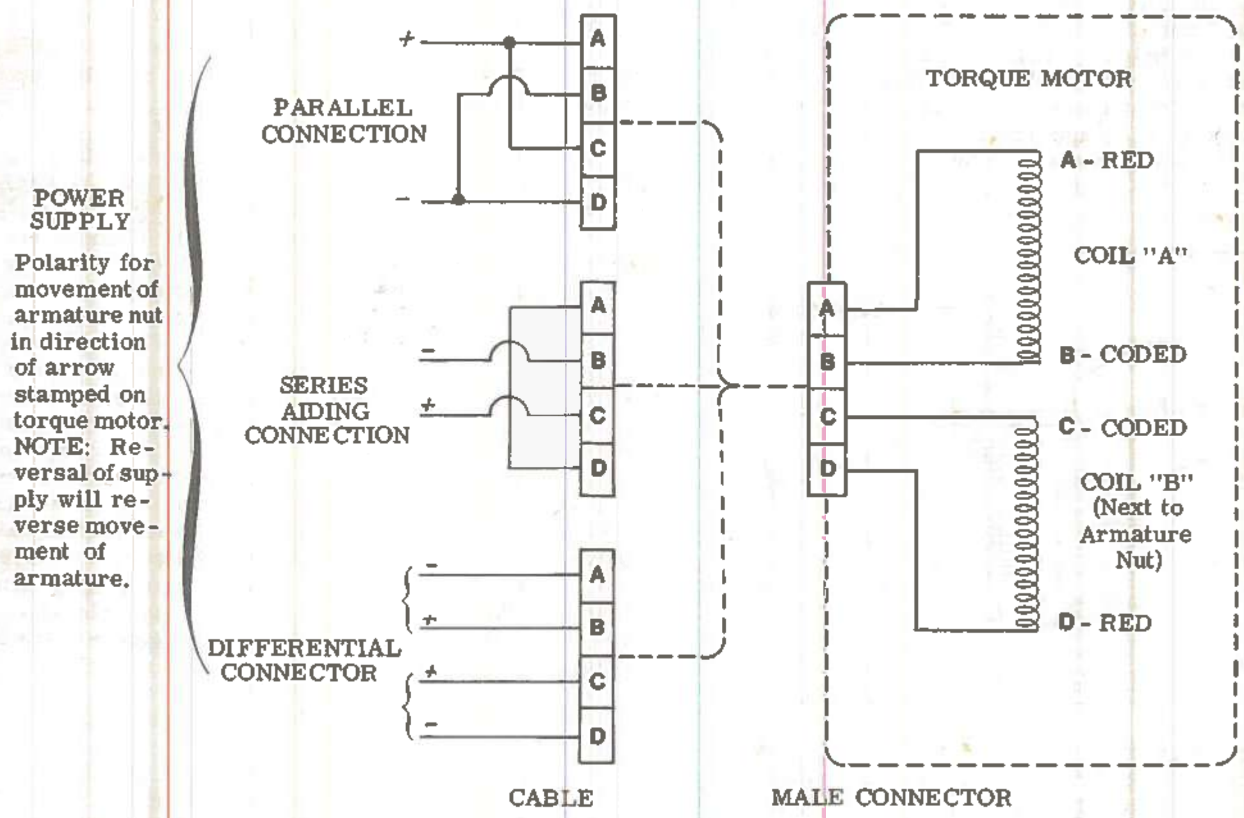


Figure 5. Schematic Diagram of Possible Wiring Connections to a Torque Motor.

7. Assemble connector to the body with four screws (3).

NOTE

Cover (7), screws (8), and washers (9) will be installed following test and calibration, Section VII.

Section VII - TEST PROCEDURE

A. TEST CONDITIONS:

HYDRAULIC

Fluid Medium: Oil viscosity grades: 150-315 SUS (32-68 cSt) @100° F (38°C)
Running: 70-250 SUS (13-54 cSt).
At start-up: 1000 SUS (220 cSt). Maximum

Fluid Temperature: $120^\circ \pm 5^\circ$ F

Flow Range: FCGT-02-A-11 5- 250 cu. in./min.
FCGT-02-B-11 50-1000 cu. in./min.

Operating Pressure: (Maximum) 3000 PSI

Reverse Free Flow: (Maximum) 1400 cu. in./min.

Differential Operating Press: 150 PSI

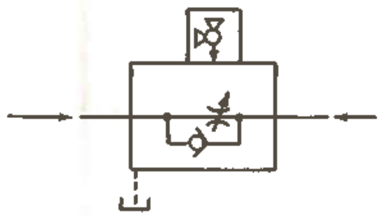
Power Supply (Recommended for two 40 Ohm coils connected parallel). See installation drawing 521555. EMCS-P-30 Assembly 631995

Hysteresis (With recommended power supply). 4% of max. current without dither. 2% of max. current with 45 mA (rms) dither.

Dither (Optimum performance) 45 mA (rms) @60 Hz.

Subplate FGTM-02-10 (Assy. 251168)

Bolt Kit BKFCGT-02-644 (Bolts must be grade 7 or better)



Standard Graphic Symbol for Fluid Power Diagrams

B. TEST

NOTE

A sample hydraulic circuit is shown in figure 6. Modify an existing test stand or obtain the necessary components to assemble the test circuit.

1. Connect subplate FGTM-02-10 (Assembly 251168) to the test stand and mount the FCGT-02 with bolt kit BKFCGT-02-644.

2. Refer to sample test circuit figure 6 during the following steps:

a. Close globe valves (6) and (15).

b. Open globe valves (1) and (12). (Vent to facilitate priming and load relief valve (11).

c. Energize hydraulic system. After system has primed, alternately adjust test relief valve (2) while closing globe valve (1) until 3000 PSI is read on gage (5) and globe valve (1) is completely closed.

d. Open globe valve (6).

NOTE

Valve may be unstable until all air is purged from the system. Allow at least one minute for valve to stablize before adjusting the metering spool.

e. Adjust metering spool (12 figure 3) for zero flow. Use a 0.05 inch hex key.

f. Open globe valve (15) and adjust metering spool (12) to the minimum flow condition noted in Table 6. Use a beaker to measure the minimum flow.

MODEL	MINIMUM FLOW
FCGT-02-A-***-11	5 cu. in./min. (81.9 cu. cm./min.)
FCGT-02-B-***-11	50 cu. in./min. (819.35 cu. cm./min.)

Table 6. Minimum Flow Adjustment.

3. Turn off hydraulics and remove valve from the test stand. Place on the work bench with torque motor (10) up. Slightly loosen screws (8) that hold torque motor (10).

4. Connect power supply (9, figure 6) to valve. Observe polarity shown in figure 5. If milliammeter reads in reverse, reverse its connections.

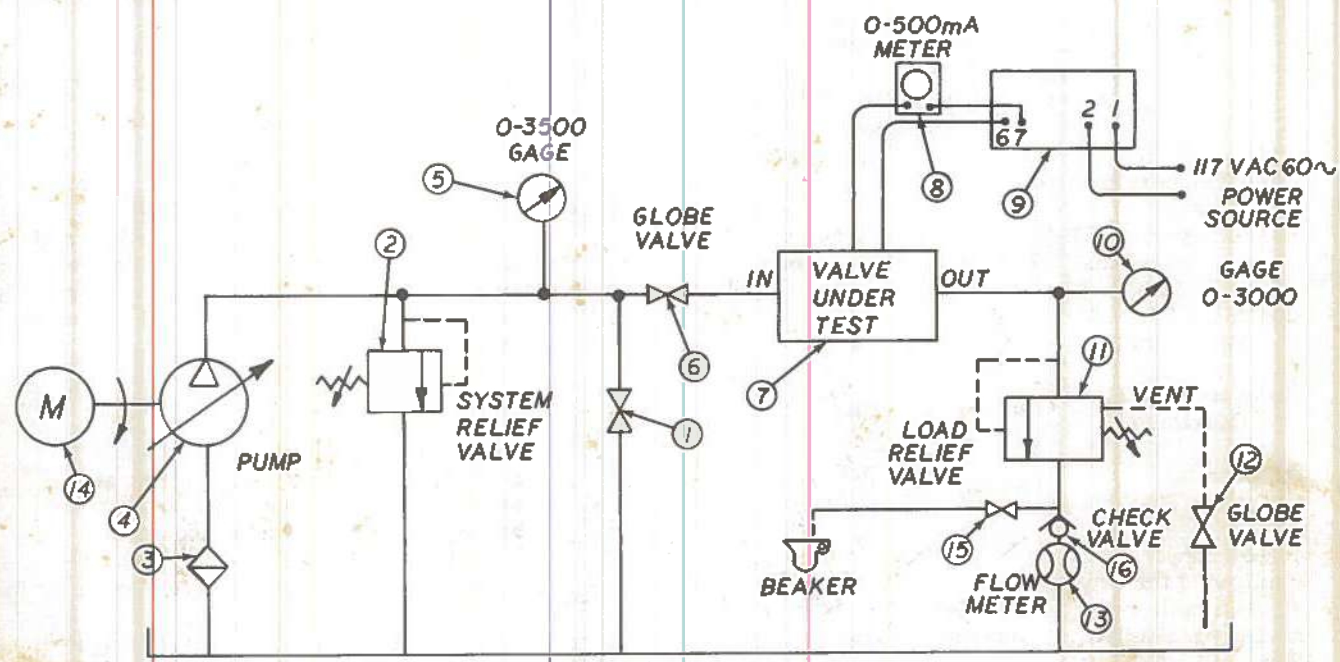
5. Set dither control high enough to feel a vibration at the torque motor armature. Position the torque motor for maximum dither as felt at the torque motor armature nut, then tighten the torque motor mounting screws to 30 lb. in. Dither must still be felt at the torque motor armature.

6. Apply full signal (300 mA for two 40 Ohm coils in parallel) to the torque motor and return to zero current. Dither must be felt throughout the entire cycle. If dither fades, repeat steps (5) and (6).

Refer to Figure 5 for correct full signal current if coils are other than noted.

7. Recalibrate minimum flow, perform steps (1) and (2).

8. Install cover (7). Secure with screws (8) and lockwashers (9). Check valve performance with power supply. Remove valve from the test stand.



1. Globe Valve
2. Test Stand Relief Valve
3. Inlet Filter
4. Variable Delivery Pump
5. Pressure Gage (0-3500 PSI)
6. Globe Valve
7. Valve Under Test
8. Ammeter (0-500 mA)
9. Power Supply Vickers 631995 or equivalent. Must be capable of delivering 0-300 mA DC to a 20 OHM inductive load.
10. Pressure Gage (0-3000 PSI)
11. Load Relief Valve
12. Globe Valve
13. Flow Meter
14. Electric drive motor approximately 10 hp for 5 gpm @3000 PSI.
15. ½" Globe Valve
16. 35 PSI Check Valve

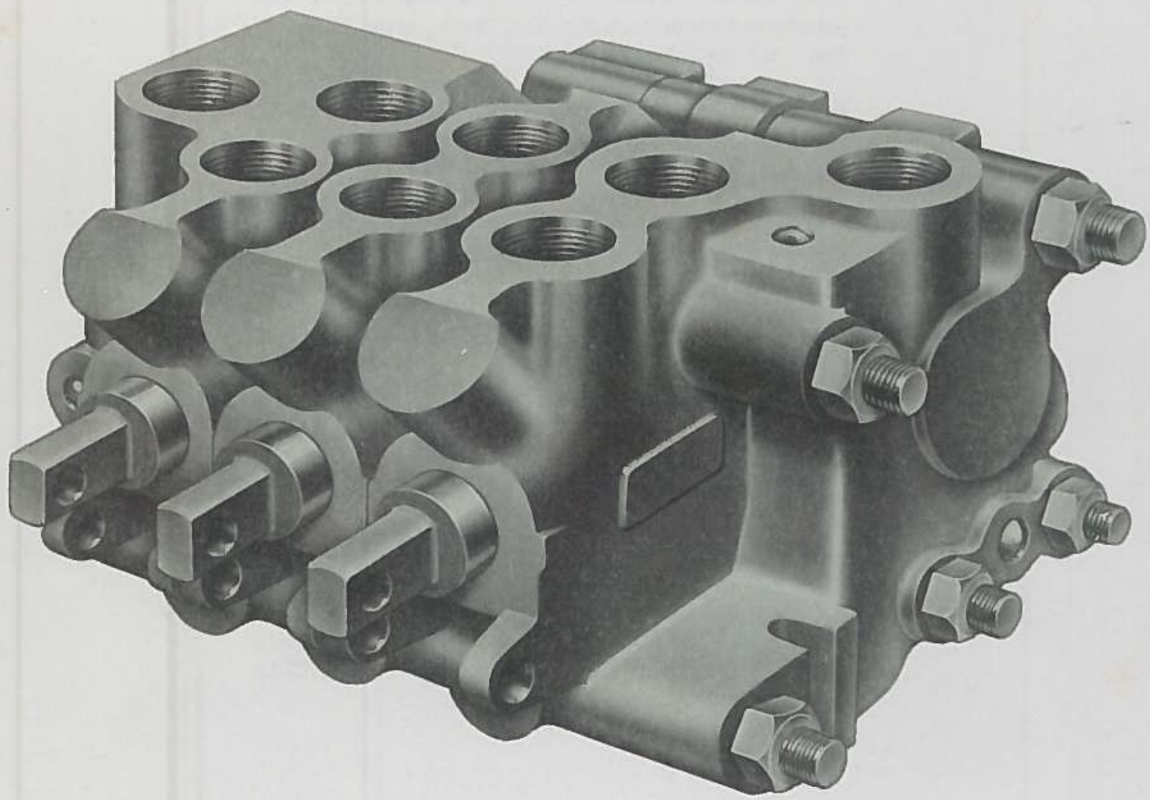
Figure 6. Test Stand for FCGT-02-*-11 Valve.

VICKERS®
A TRINOVA COMPANY

Overhaul Manual

Multiple Unit Valves

CM2 & CM3 Series -20 Design
CM2 & CM3 Series -30 Design



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 7-1-86 **M-2400-S**

FOREWARD

This manual illustrates and describes the recommended procedure for servicing the CM2 and CM3 series valves.

Valves of the -30 design will be referred to throughout this manual, but this information is essentially the same for the -20 design valves. Service parts are generally interchangeable between the -20 and -30 design valves, however, it is recommended that the catalogs referenced in Table I be consulted for service parts for the respective design. Customers who wish to incorporate -30 design sections in -20 design valves can do so without concern. In this instance, a tie bolt must be left out. This does not affect the operation or function of the valve as one tie bolt on the -20 design is redundant.

To service these valves, read this manual thoroughly, and follow the instructions carefully.

Comments or suggestions concerning this publication may be directed to the Mobile Service Department of Vickers.

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SECTION I - INTRODUCTION

A. PURPOSE OF MANUAL

This manual has been prepared to assist the users of Vickers CM2 and CM3 Series-20/-30 Design Multiple Unit Valves in properly maintaining and repairing their units. In the sections which follow, the multiple unit valves are described in detail, their theory of operation is discussed and instructions are given for their proper installation, maintenance and overhaul.

B. GENERAL INFORMATION

1. Related Publications - Service parts information and installation dimensions are not contained in this manual. The parts catalogs and installation drawings listed in Table I are available from your local Vickers Mobile Division application engineering office, or from:

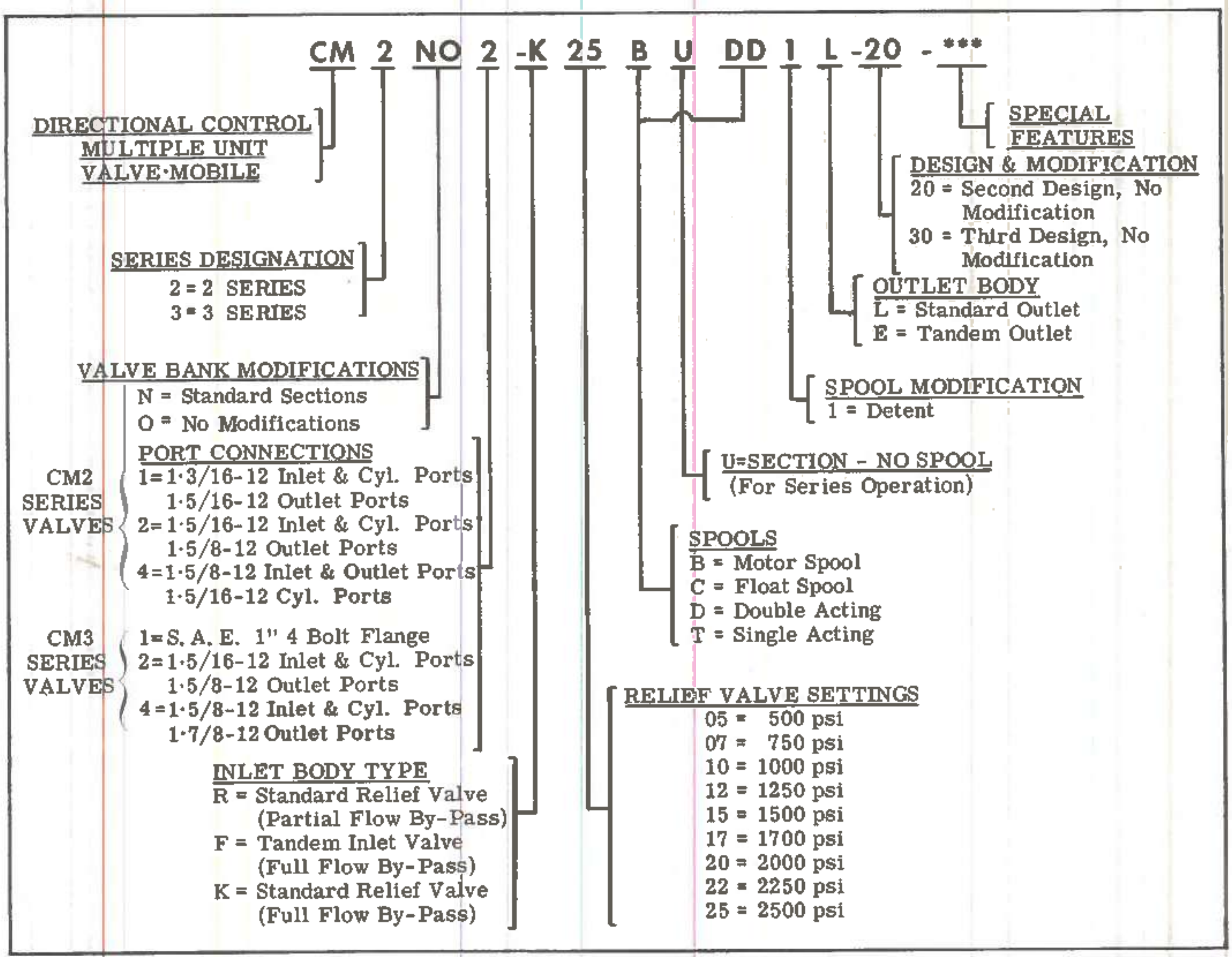
Vickers
Mobile Hydraulics Division
P. O. Box 302, Troy, Michigan 48084
Attn: Mobile Service Department

2. Model Codes - There are many variations within each basic model series, which are covered by variables in the model code. Table II is a complete breakdown of the codes covering these units. Service inquiries should always include the complete unit model number, which is stamped on the valve bodies.

TABLE I
AVAILABLE PARTS CATALOGS AND INSTALLATION DRAWINGS

MODEL SERIES	PARTS CATALOGS	INSTALLATION DRAWINGS
CM2-20	M-2401-S	M-259218
CM2-30	M-2403-S	
CM3-20	M-2402-S	M-259219
CM3-30	M-2404-S	

TABLE II - MODEL CODE BREAKDOWN



SECTION II - DESCRIPTION

A. GENERAL

CM2 and CM3 Series -20/-30 Design Valves are made up of directional control valve sections mounted in banks and connected internally to common pressure and tank return passages. A valve bank usually consists of an inlet and operating (R*, F*, or K*), a number of operating sections (*) and an operating and outlet section (*L or *E). Each operating section contains a sliding spool (for example B, C, D or T Spool). In valve banks where only one operating section is required, an R* section is used with an L or E tank plate section.

B. ASSEMBLY AND CONSTRUCTION

Figure 1 is a cross-sectional view showing the construction and assembly of a three-section valve. Each section normally contains a sliding spool with centering springs and a check valve. The inlet section also contains a relief valve assembly.

Passages between the bodies connect each section to the common inlet and tank ports. Seal rings between the sections seal the connecting passages. Sections are held together by studs and nuts.

C. DETENT FEATURES

1. Spool Detents - A spool detent assembly consists of a special end cap with a spring loaded plunger and a spool extension. The plunger engages in grooves of the spool extension to hold the spool in the desired position (see Figure 9).

D. MOUNTING

CM2 and CM3 Series -20/-30 Design Valves have mounting lugs cast into the inlet and outlet sections.

E. INSTALLATION DRAWING

Vickers Mobile Hydraulics Division application engineers should be consulted for valve ratings and applications. (Refer to the installation drawing listed in Table I for the performance information.)

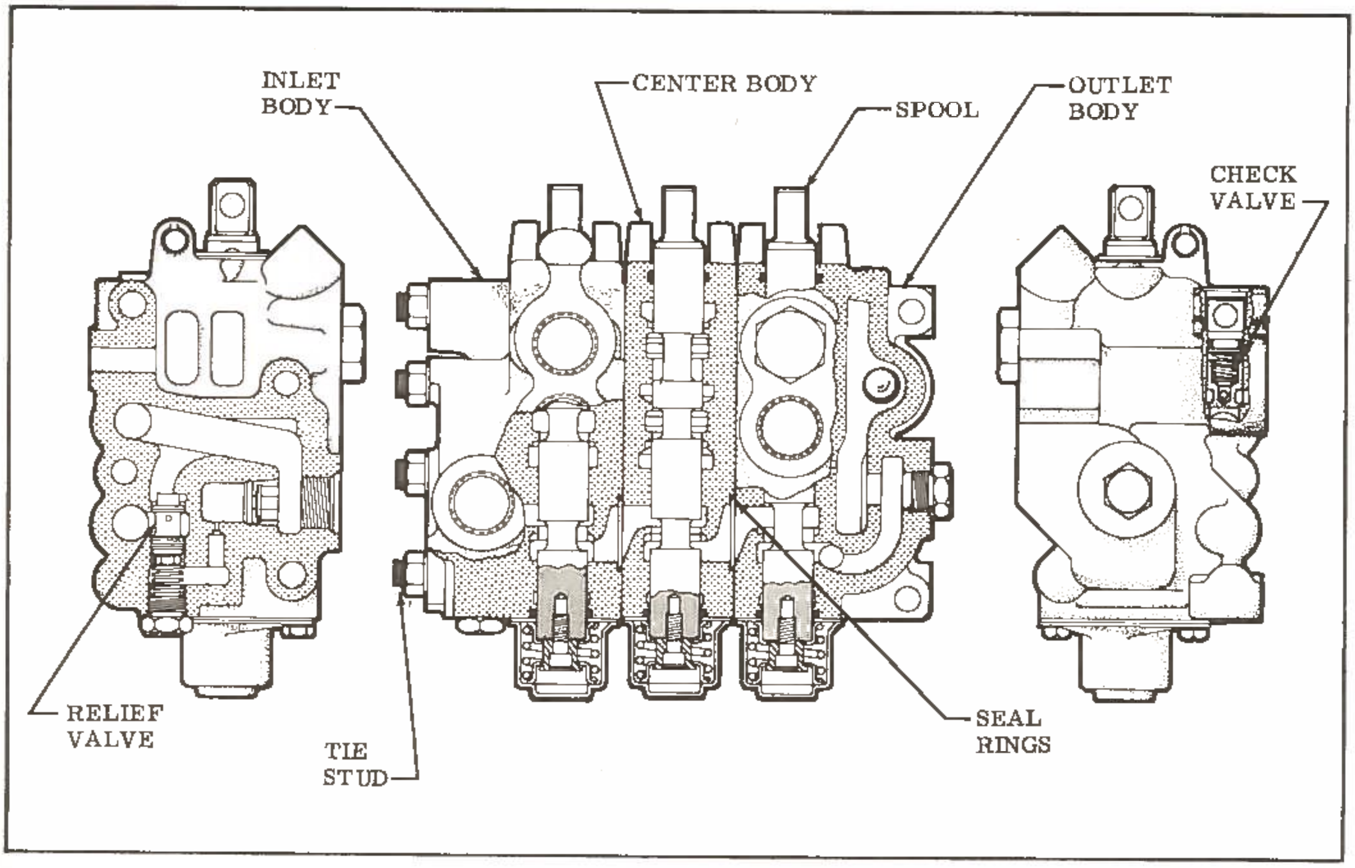


Figure 1

SECTION III - PRINCIPLES OF OPERATION

A. GENERAL

Figure 2 is a schematic illustration of a four section valve, showing the cylinder ports and the by-pass pressure and tank passages. The pressure passage is used to carry fluid to the cylinder ports when the the spools are shifted. The by-pass passage permits flow directly to the outlet when the spools are not being operated. The tank passages carry fluid to the tank port by return flow from the cylinder ports or fluid diverted past the flow control and relief valve.

The spools are shown in the centered or neutral position. Under these conditions, fluid in the pressure passage is blocked from the cylinder ports by the spool lands. Flow through the valve is through the by-pass and tank passage to the tank port.

B. OPERATING SECTIONS

1. Inlet Section - The CM2 and CM3 series valve banks may be obtained with operating, R*, F*, or K*, inlet sections. These sections are available with B, C, D, or T, type spools.

These sections are individually described below.

(a) R* Section - The R* section is equipped with an integral relief valve for overload protection. It is built to accept a check valve to prevent return flow through the valve.

The integral relief valve, with an orifice plug, also acts as a partial flow control valve. This feature lowers the pressure drop between the inlet and outlet ports. (See paragraph 4 for relief valve and flow control operation.)

The relief valve cracking pressure is pre-set at the factory. The pre-set cracking pressures range up to 2500 psi maximum. (See Table II Model Code for pressure settings.)

(b) F* Section - The F* section has two pressure connections. One connection is made to the pump source and the second connection is made with a preceding valve assembly to accept the by-pass flow for tandem operation.

The F* section like the R* section is built to accept a check valve to prevent return flow when this feature is required. However, F* sections do not employ relief valve or partial flow by-pass.

(c) K* Section - The K* section is essentially the same as the R* section except it has a full flow by-pass feature.

2. Outlet Sections

(a) *L Section - When two or more spools are required in a valve bank, the last section will be an *L section. The "*" denotes the spool type. This section contains the exhaust oil port and also is built to accept a check valve to prevent back flow when this feature is required.

(b) *E Section - This section is used for tandem operation by providing an outlet connection through which the by-pass feature for pump unloading is extended on to a subsequent valve bank. It is used in conjunction with an "F*" type inlet section in the next valve bank. Like the *L section it contains an operating spool and is built to accept a check valve to prevent back flow when this feature is required.

3. Spool Operation

General - Four standard spool designs are available ("B," "C," "D," or "T"). Any combination of spools may be used with a valve bank to perform a variety of operations. All operating spools are equipped with centering springs which return the spools to neutral.

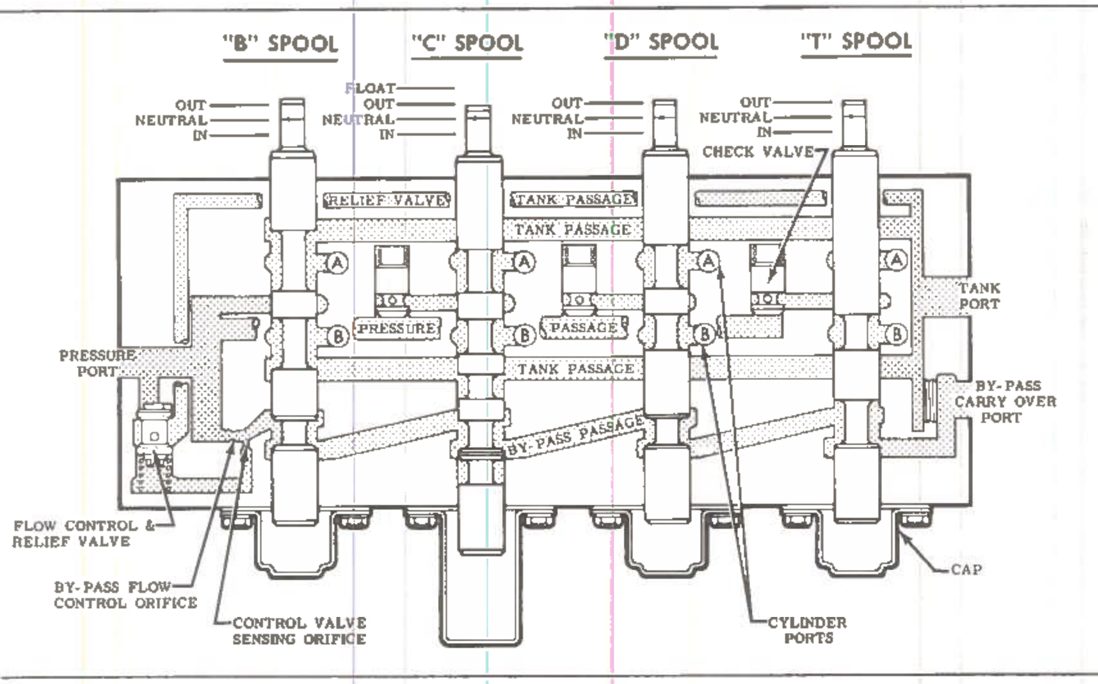
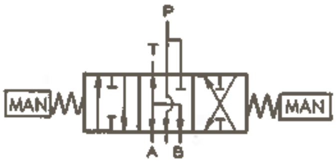


Figure 2

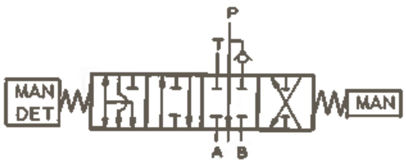
For convenience A. S. A. symbols (Y32. 10-1958) are also shown with the following descriptions of each spool.

(a) "B" - Motor Spool - "B" spools are used when flow is directed to the operation of a hydraulic motor instead of a cylinder. These spools are double acting in character so that the motor may be rotated in either direction. The cylinder ports are left partially open in the neutral position to allow free flow of oil between the motor and reservoir. See Figure 3 for spool position vs. flow characteristics.



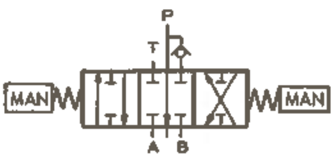
"B" MOTOR SPOOL

(b) "C" Float Spools - "C" spools are double acting with an additional float position. The spool is retained in the float position by a detent, and it is spring centered to neutral from the "in" and "out" positions. Both cylinder ports are open to the tank in the float position to permit free flow of oil in either direction. See Figure 4 for spool position versus flow.



"C" FLOAT SPOOL

(c) "D" Double Acting Spool - "D" spools are used for applications where pump flow must be directed to either end of a cylinder, depending on the direction of movement required. The end of the cylinder not under pressure has its return flow directed to tank via internal coring of the valve sections. See Figure 5 for spool position versus flow.



"D" DOUBLE ACTING SPOOL

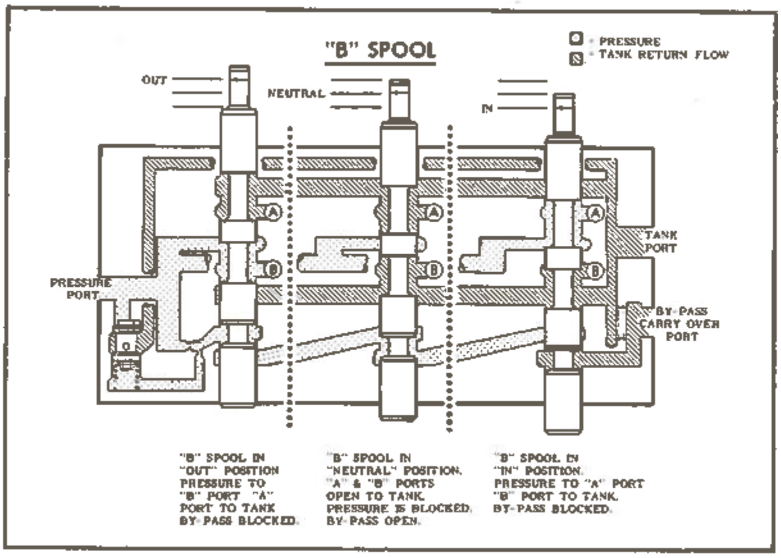


Figure 3

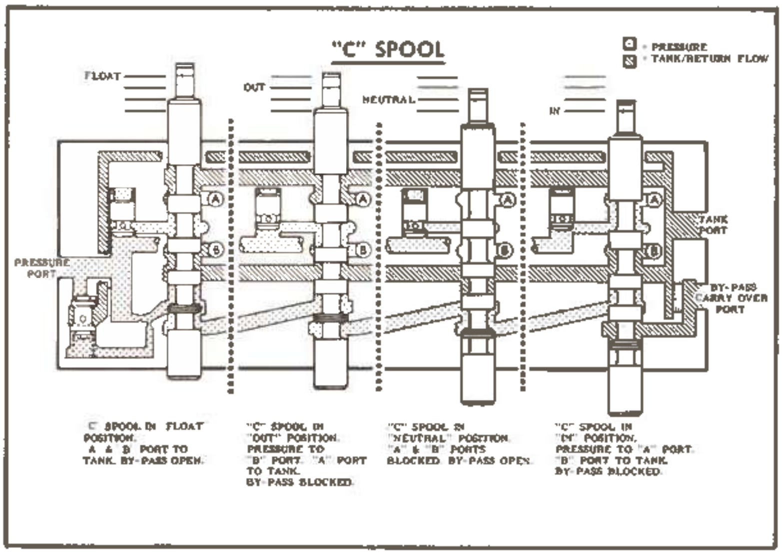


Figure 4

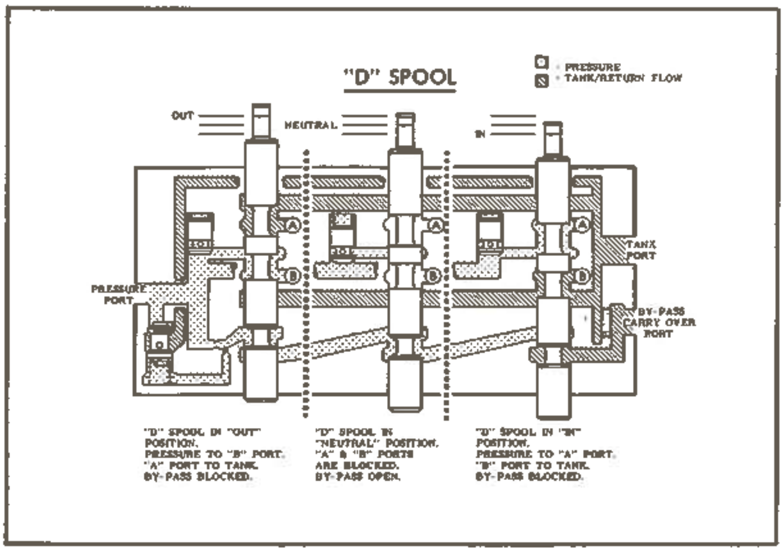
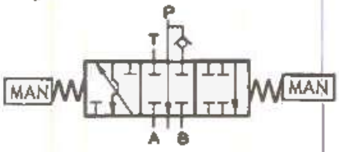


Figure 5

(d) "T" Single Acting Spool - "T" spools direct flow to one end of an operating cylinder only as in the example of the lift mechanism on a fork-type truck. Return flow is from the same end of operating cylinder and relies on gravity or mechanical means. See Figure 6 for spool position versus flow.



"T" SINGLE ACTING SPOOL

4. Flow Control and Relief Valve

General - The partial flow by-pass system in the CM2 and CM3 series valves makes use of a compound type flow control and relief valve arrangement. By sensing the pressure drop across an orifice at the entrance to the by-pass, the valve acts as a flow control to limit flow through the by-pass.

When a spool is completely shifted, the flow control is inoperative and full pump volume is available to the system. The control valve then functions as an overload relief valve. System pressure is limited to a prescribed maximum by the action of this valve.

(a) Flow Control - Figure 7A shows the flow control valve operation with the spool in neutral. Flow across the by-pass orifice results in a pressure drop. The decreased pressure is sensed at the spring end of the valve sub-assembly through a sensing orifice. The slightly higher pressure at the other end of the valve permits it to shift down, diverting excess flow to the tank passage. With less than rated flow, shown on the installation drawing, there would be insufficient pressure drop across the by-pass orifice and the flow control valve would return to the closed position. Since the control valve is held closed by the large spring and all flow would be through the by-pass passage.

(b) Relief Valve - Operation of the relief valve feature is shown in Figure 7B. Here an operating spool would be shifted, porting fluid to the system and blocking the by-pass.

Figure 7B shows operation at less than the relief valve setting. There is no flow over the by-pass orifice, so full system pressure is sensed at the spring end of the control valve, as well as the

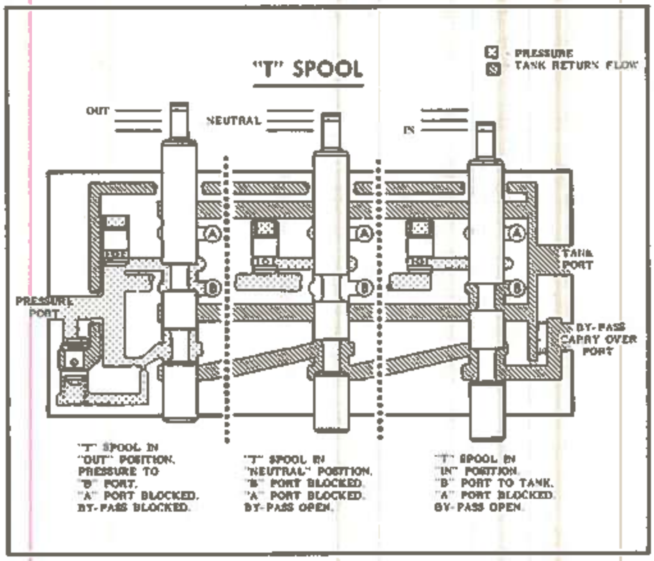


Figure 6

opposite end. The valve is thus hydraulically balanced and the large spring holds it closed.

Maximum pressure is determined by the setting of the small spring inside the control valve assembly. When system pressure is high enough to overcome this small spring, the poppet is forced off its seat. (See Figure 7C) Fluid immediately flows past the poppet to the tank passage. This flow creates a pressure drop across the sensing orifice and the control valve is no longer hydraulically balanced. balanced. When this pressure differential is great enough to overcome the large spring, the valve shifts permitting flow to the tank passage.

5. Check Valve - Timing of the valve spools is such that the cylinder port opens to pressure and tank before the by-pass passage is completely blocked. To prevent return flow from passing into the pressure passage, check valves are provided in each operating section except the "B" section. The load is thus prevented from dropping.

6. Detent - The spool detent consists of a special end cap with a spring loaded plunger. The plunger engages in a groove in the spool extension and holds the spool in the desired position. Detent parts are illustrated in the exploded view in Figure 9A.

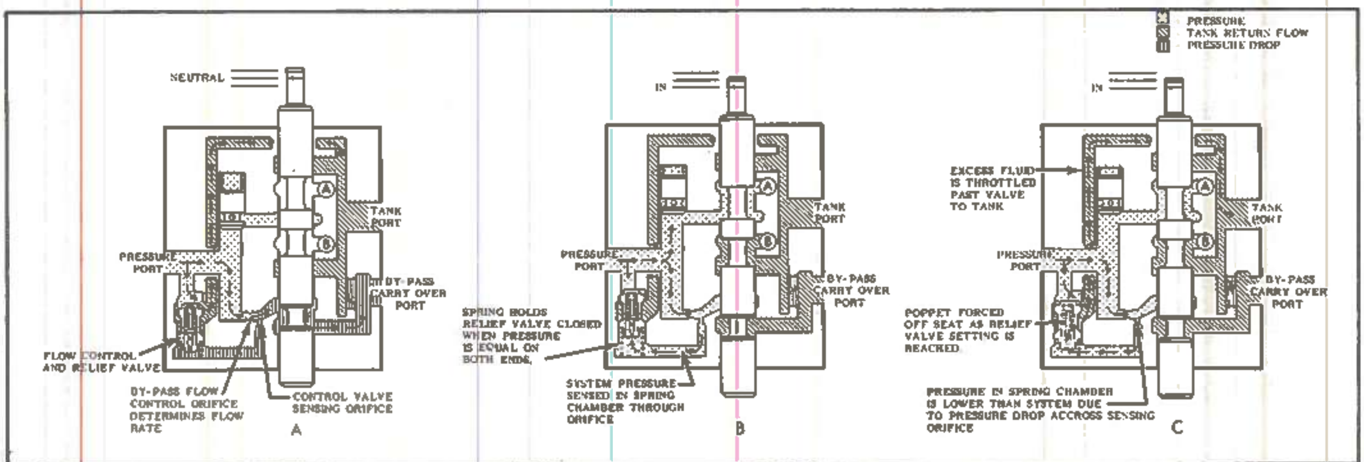


Figure 7

7. Tandem Operation - Tandem operation permits operation of two banks of valves from the same pumping source. An internal plug in the outlet section of the first bank (see Figure 8) separates the by-pass passage from the tank passage. Cylinder exhaust oil is returned to tank via the alternate discharge port, and by-pass oil is directed out the primary discharge port to the by-pass port of the bank.

In Figure 8, either bank can be operated separately or both simultaneously. This is possible because of the tandem by-pass connection from the inlet connection of the first bank to the F inlet connection of the second bank. If neither bank is operating, part of the fluid flows through both by-pass passages directly to tank. The balance is diverted through the tank passage of the first section as shown in Figure 2.

In some cases, it is desirable to have tandem valves connected in series where, the second bank is dependent upon the operation of the first bank. The first bank has control priority because the tandem by-pass connection is not used. The cylinder by-pass oil of the first bank is directed out of primary discharge port to the inlet port of the second bank. Use a "K" inlet section in the first bank if full flow is desired to the second bank. Otherwise reduced flow will be encountered.

C. NON-OPERATING SECTIONS

1. General -The CM2 valve non-operating sections are the "E" and "L" outlet sections and a center "U" section. These sections do not have operating spools. The functions of these sections are as follows:

(a) "E" Outlet Section - The "E" type section provides an outlet section by which the by-pass feature for pump unloading is extended to a subsequent valve bank (tandem operation). It is generally used in conjunction with the "F" type inlet section on the subsequent valve bank assembly. This "E" type section is only used with one spool banks.

(b) "L" Outlet Section - The "L" type section is basically the same section as the "E" section except it provides only one connection for exhaust oil and is used as the last section on a single spool bank where tandem operation is not required.

(c) "U" Center Section - The "U" section, when mounted between two operational sections, permits the operation of two cylinders or motors in series. This is accomplished by porting the outlet of the first operating section to the inlet of the second operating section.

NOTE

It should be noted that the pressure drop across the valve, when used in series operation, will be the sum of the pressure drops for each section.

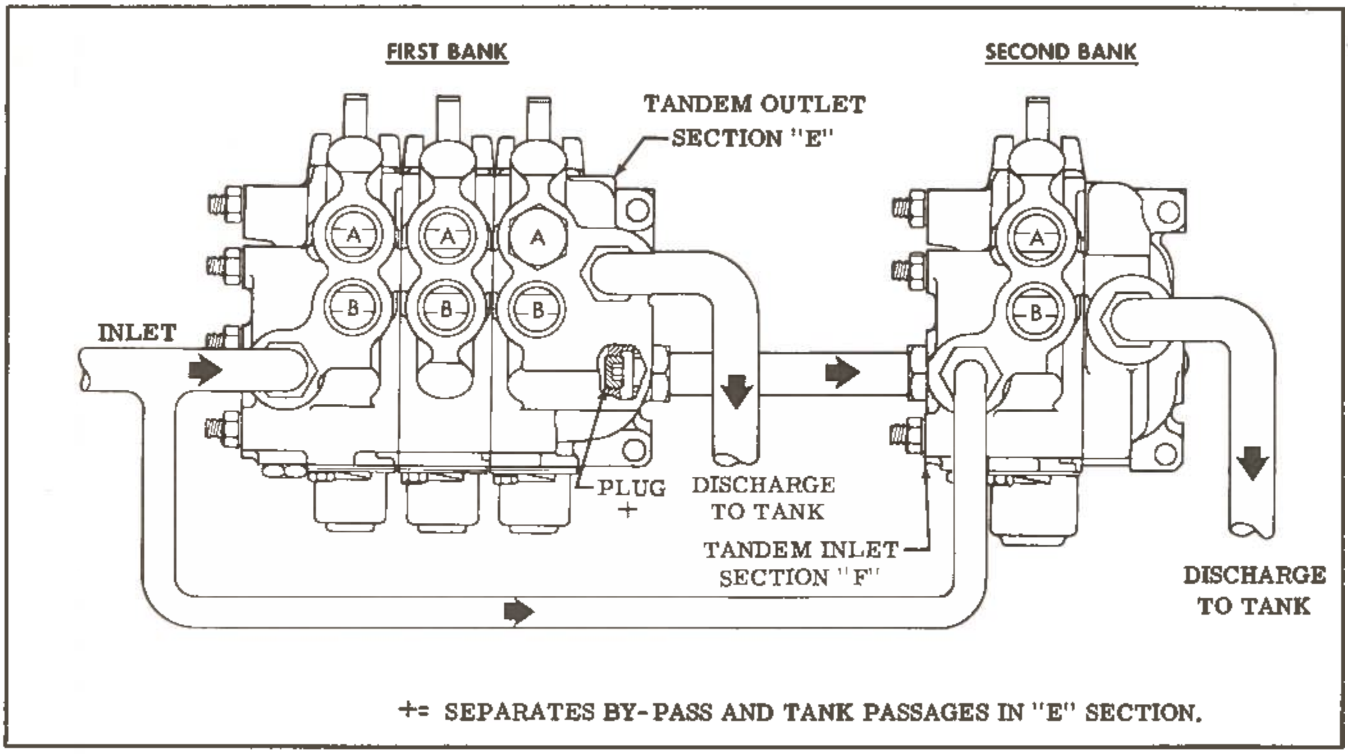


Figure 8

SECTION IV - INSTALLATION AND OPERATING INSTRUCTIONS

A. INSTALLATION DRAWINGS

Installation drawings M-259218 and M-259219 should be consulted for installation dimensions.

B. MOUNTING

These valves can be mounted in any position. Enough clearance must be left to provide access to the port connections and to permit actuating the control mechanism. The valves should be securely bolted to the mounting surface.

NOTE

Valves should be mounted on a relatively flat surface to prevent possible distortion of the valve bodies.

C. PORT CONNECTIONS

All connections are compatible with standard SAE fittings and "O" ring seals. It is only necessary to tighten fittings so that there is a firm metal-to-metal contact.

D. RELIEF VALVE

Relief valve sub-assemblies in the inlet section are preset and tested by Vickers for given pressure settings. Selection of the relief valve setting is based on the work requirements of the system. If a different relief valve setting is required, the valve sub-assembly should be replaced (see parts catalog M-2401-S, M-2402-S, M-2403-S or M-2404-S).

E. TANDEM INSTALLATION

1. Piping arrangement for tandem series operation is shown in Figure 8.

2. The outlet section of the first bank must be an "E" section which is equipped with a plug (see Figure 8) to block the primary discharge port from tank. The discharge to tank port must be connected to tank.

NOTE

Slight leakage past the internal plug is permissible. The plug should not be tightened excessively, as there is the danger of distorting the body and causing the spool to bind.

F. HYDRAULIC TUBING

NOTE

For instructions on pickling, refer to Vickers Instruction Sheet M-9600.

1. All tubing must be thoroughly cleaned before installation to remove dirt, rust and scale. Recommended methods of cleaning are sand blasting, wire brushing and pickling.

2. The number of bends in tubing should be kept to a minimum to prevent excessive turbulence and friction of oil flow.

3. Tubing should not be bent too sharply. The minimum radius for bends is three times the inside diameter of the tube.

4. To minimize flow resistance and the possibility of leakage, only as many fittings and connections as are necessary for proper installation should be used.

G. HYDRAULIC FLUID RECOMMENDATIONS

The oil in a hydraulic system serves as the power transmission medium. It is also the system's lubricant and coolant. Selection of the proper oil is a requirement for satisfactory system performance and life. Oil must be selected with care and with the assistance of a reputable supplier.

TWO IMPORTANT FACTORS IN SELECTING AN OIL ARE:

1. Antiwear Additives - The oil selected must contain the necessary additives to insure high antiwear characteristics.

2. Viscosity - The oil selected must have proper viscosity to maintain adequate lubricating film at system operating temperature.

SUITABLE TYPES OF OIL ARE:

1. Crankcase Oil meeting API service classification MS. The MS (most severe) classification is the key to proper selection of crankcase oils for Mobile hydraulic systems.

2. Antiwear Type Hydraulic Oil - There is no common designation for oils of this type. However, they are produced by all major oil suppliers and provide the antiwear qualities of MS crankcase oils.

3. Certain Other Types of Petroleum Oils are suitable for Mobile hydraulic service if they meet the following provisions:

(A) Contain the type and content of antiwear compounding found in MS crankcase oils or have passed pump tests similar to those used in developing the antiwear type hydraulic oils.

(B) Meet the viscosity recommendations shown in the following table.

(C) Have sufficient chemical stability for Mobile hydraulic system service.

The following types of oil are suitable if they meet the above three provisions:

Series 3 Diesel Engine Oil
Automatic Transmission Fluid Types A, F and DEXRON
Hydraulic Transmission Fluid Types C-1 and C-2

The following table summarizes oil types recommended for use with Vickers equipment in Mobile hydraulic systems by viscosity and service classification.

TABLE III

Hydraulic System Operating Temperature Range (Min. * To Max.)	SAE Viscosity Designation	American Petroleum Institute (API) Service Classification
0°F. to 180°F.	10W	MS
0°F. to 210°F.	10W-30**	MS
50°F. to 210°F.	20-20W	MS

* Ambient Start Up Temperature
** See paragraph on Viscosity Index

OPERATING TEMPERATURE:

The temperatures shown in table III are cold start-up to maximum operating. Suitable start-up procedures must be followed to insure adequate lubrication during system warm-up.

ARCTIC CONDITIONS:

Arctic conditions represent a specialized field where extensive use is made of heating equipment before starting. If necessary, this, and judicious use of SAE 5W or SAE 5W-20 oil in line with the viscosity guide lines shown in the table, may be used. Dilution of SAE 10W (MS) oil with maximum of 20% by volume of kerosene or low temperature diesel fuel is permissible. During cold start-up, avoid high speed operation of hydraulic system components until the system is warmed up to provide adequate lubrication. Operating temperature should be closely monitored to avoid exceeding a temperature of 130°F. with any of these light weight or diluted oils.

OTHER FACTORS IN SELECTING AN OIL ARE:

1. Viscosity - Viscosity is the measure of fluidity. In addition to dynamic lubricating properties, oil must have sufficient body to provide adequate sealing effect between working parts of pumps, valves, cylinders and motors, but not enough to cause pump cavitation or sluggish valve action. Optimum operating viscosity of the oil should be between 80 SSU and 180 SSU. During sustained high temperature operation viscosity should not fall below 60 SSU.

2. Viscosity Index - Viscosity index reflects the way viscosity changes with temperature. The smaller the viscosity change the higher the viscosity index. The viscosity index of hydraulic system oil should not be less than 90. Multiple viscosity oils, such as SAE 10W-30, incorporate additives to improve viscosity index (polymer thickened). Oils of this type generally exhibit both temporary and permanent decrease in viscosity due to the oil shear encountered in the operating hydraulic system. Accordingly, when such oils are selected, it is desirable to use those with high shear stability to insure that viscosity remains within recommended limits.

3. Additives - Research has developed a number of additive agents which materially improve various characteristics of oil for hydraulic systems. These additives are selected to reduce wear, increase chemical stability, inhibit corrosion and depress the pour point. The most desirable oils for hydraulic service contain higher amounts of antiwear compounding.

SPECIAL REQUIREMENTS:

Where special considerations indicate a need to depart from the recommended oils or operating conditions, see your Vickers sales representative.

CLEANLINESS:

Thorough precautions should always be observed to insure that the hydraulic system is clean:

1. Clean (flush) entire system to remove paint, metal chips, welding shot, etc.

2. Filter each change of oil to prevent introduction of contaminant into the system.

3. Provide continuous oil filtration to remove sludge and products of wear and corrosion generated during the life of the system.

4. Provide continuous protection of system from entry of airborne contamination.

5. During usage, proper oil filling and servicing of filters, breathers, reservoirs, etc., cannot be over-emphasized.

SECTION V - INSPECTION AND MAINTENANCE

A. SERVICE TOOLS

No special tools are required to service Vickers CM2 or CM3 series multiple unit valves.

B. INSPECTION

Periodic inspection of spool operation, oil condition and pressure connections saves time-consuming breakdowns and unnecessary parts replacement.

1. All hydraulic connections must be tight. Loose connections not only allow leakage but also permit air to be drawn into the system, resulting in noisy and erratic operation.

2. Spools should return to neutral automatically when the control is released. The centering spring force is approximately 60 to 120 pounds. If more force is necessary, the spool may be binding or control linkage may be faulty.

3. System filters and reservoir should be checked periodically for foreign particles. If excessive contamination is found, the system should be drained. The reservoir must be cleaned thoroughly before refilling.

C. ADDING FLUID TO THE SYSTEM

When hydraulic fluid is added to the system, it should be pumped through a 25 micron filter. If such a filter is not available, or practical to use in the field, a funnel with a fine wire screen (200 mesh or better) can be used.

It is important that oil be clean and free of all substance which will cause improper operation and excessive wear of the pump or other hydraulic units in the system. Be sure to purge all air from the system.

D. LUBRICATION

Internal lubrication is provided by system oil.

E. REPLACEMENT PARTS

Only genuine parts manufactured or sold by Vickers should be used as replacement parts for these valves. Only Vickers knows the true quality level required of each part. These are listed in parts catalogs M-2401-S, M-2402-S, M-2403-S and M-2404-S copies of which are available on request.

F. TROUBLE SHOOTING

Table IV lists the difficulties which may be experienced with the unit and hydraulic system. It indicates the cause and remedy for each of the troubles listed. It should always be remembered that pressure and delivery are factors which are usually dependent upon each other. Adequate pressure gage equipment and a thorough understanding of the operation of the complete hydraulic system are essential to diagnose improper operation.

TABLE IV - TROUBLE, CAUSE AND REMEDY CHART

TROUBLE	PROBABLE CAUSE	REMEDY
Oil leaks at either end of spool.	Defective "O" rings in valve body.	Replace "O" rings.
Spring-centered spools do not return to neutral.	Broken springs.	Replace springs.
	Bent spool.	Replace with new section of same size and type.
	Foreign particles.	Clean system and valve.
	Misalignment of operating linkage	Check linkage for binding condition.
	Valve tank improperly torque.	Retorque nuts to specified ratings.
Detent type spools will not stay in detent position.	Worn detent barrel.	Replace detent barrel.
	Weak or broken detent spring.	Replace detent spring.
No motion, slow or jerky action of hydraulic system.	Relief valve not properly set, or stuck in base and/or worn.	Repair, clean and readjust.
	Dirt or foreign particles lodged between relei valve control poppet and seat.	Disassemble, clean and reassemble.
	Valve body cracked inside.	Replace valve section.
	Spool not moved to full stroke.	Check travel.
No relief valve action (High Pressure)	Small particle of dirt plugging orifice in relief valve sub-assembly.	Remove relief valve and check hole. If blocked, clear hole.
	Relief Valve S.A. installed backwards.	Install properly.
Load will not hold.	Oil by-passing between spool and body.	Replace valve.
	Oil by-passing piston in cylinder.	Repair or replace cylinder.
	Spool not centered	Refer to above spool remedies.
Load drops when spool is moved from neutral to a power position.	Dirt or foreign particles lodged between check valve poppet and seat.	Disassemble, clean and reassemble.
	Scored or sticking check valve poppet.	Replace poppet.

SECTION VI - OVERHAUL

A. GENERAL

During disassembly, particular attention should be given to identification of parts for reassembly. Spools are selectively fitted to valve bodies and must be returned to the same bodies from which they were removed. Valve sections should be reassembled in the same order.

Figure 9 and 9A is an exploded view showing the proper relationship for reassembly. Reference is made to these figures in the procedures which follow.

B. DISASSEMBLY

1. Controls - Be sure the unit is not subjected to pressure. Disconnect and cap all lines and disconnect linkage to the spool. If hand levers are used, remove the "E" rings which retain the fulcrum rod and remove the links, levers and retaining rings.

2. Attaching Parts - Remove the four tie studs and nuts and separate the valve sections. Be careful not to destroy or lose spacers.

3. End Caps - Remove the two screws which secure the spool and cap and remove the cap. If the cap has a detent assembly, screw out the detent plug and remove the spring and piston. Remove the "O" ring from the body.

4. Operating Spool - Slide the spool out of its bore from the cap end and remove the "O" rings from the valve body around the spool bore. Do not remove the centering spring and retainers unless it is necessary to replace them.

5. Check Valve - Grip the stem of the check valve plug with pliers and pull it out of the valve body. Remove the "O" ring and back-up ring. Remove the spring and poppet from the valve body.

6. Relief Valve Sub-Assy - Screw out the plug which retains the relief valve and remove the "O" ring from the plug. Remove the spring and the relief valve sub-assembly. In F* sections, remove the solid plug.

7. Valve Body - Remove the plug and "O" ring from the blocked cylinder port on models with a single acting spool. If the alternate discharge port is plugged, it is not necessary to remove the plug unless the body is to be replaced.

C. CLEANING, INSPECTION AND REPAIR

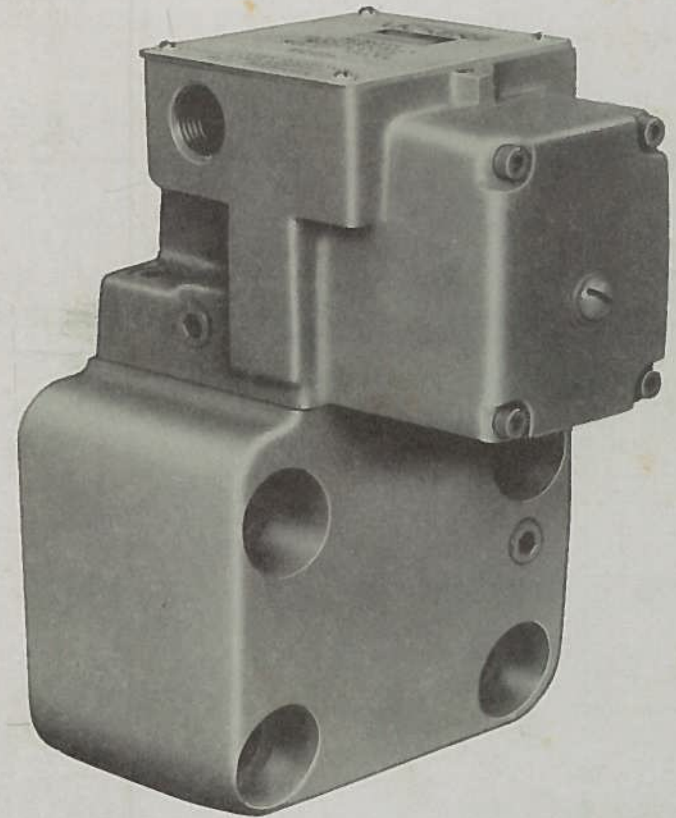
6 28

VICKERS®
A TRINOVA COMPANY

Overhaul Manual

Remote Electrically Operated Relief Valves

CGE-* *-2-002-11/12
CGE-* *-3-002-11/12



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I-3347-S

MODEL CODE BREAKDOWN

C G E - ** - * (V) - 002 - 1*

- C G: RELIEF VALVE
- G: GASKET MOUNTED
- E: REMOTE ELECTRICALLY MODULATED
- **: 06 - 60 SERIES (3/4" NOMINAL VALVE SIZE); 10 - 100 SERIES (1-1/4" NOMINAL VALVE SIZE)
- *: 2 - 2000 PSI PRESSURE; 3 - 3000 PSI PRESSURE
- (V): V - HI-VENTING PRESSURE (OMIT IF NOT REQUIRED)
- 002: COIL DESIGNATION (NUMBER TIMES 10 EQUALS COIL RESISTANCE) (20 OHM COIL)
- 1*: DESIGN NUMBER -11, -12

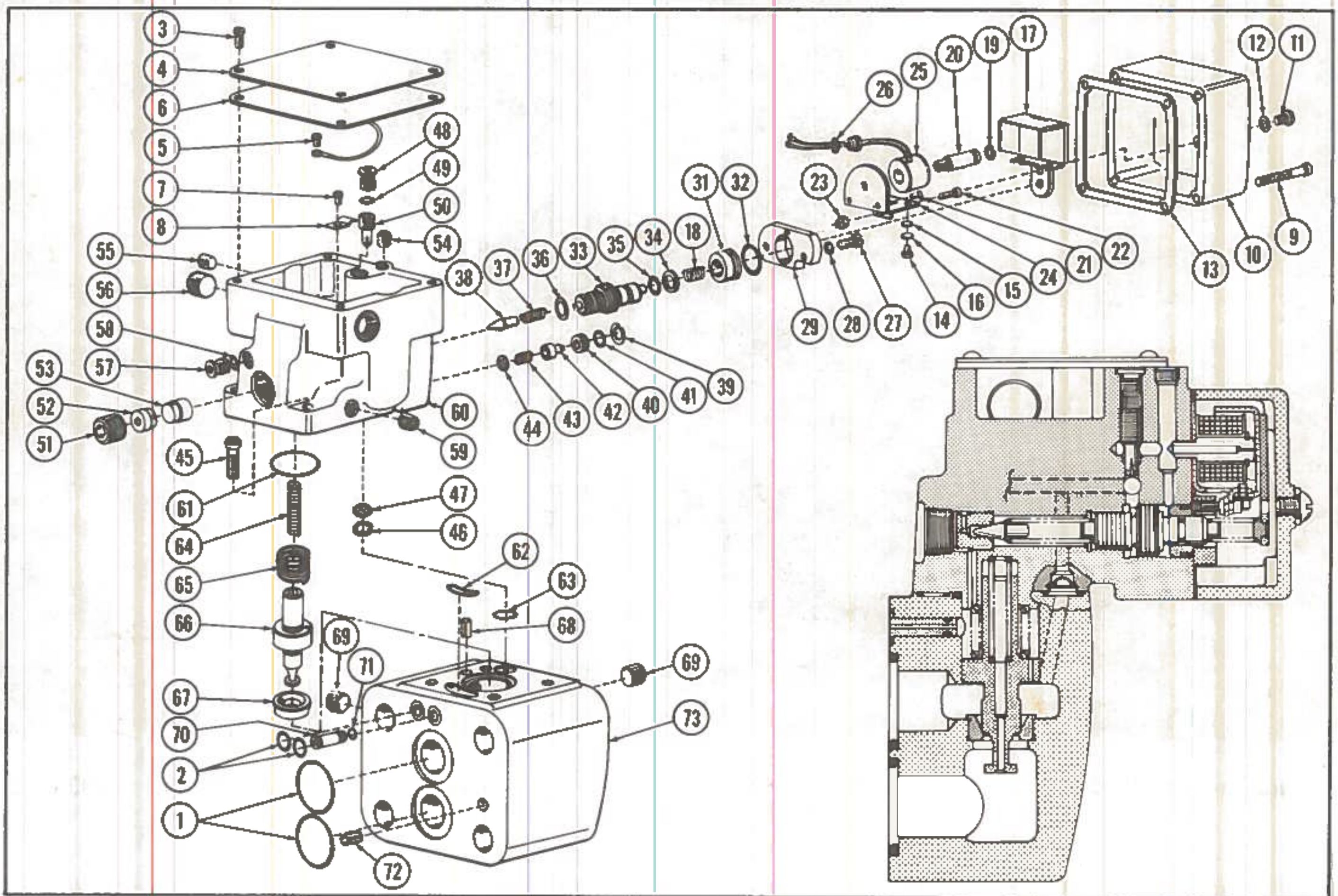


FIGURE 1. REMOTE ELECTRICALLY OPERATED RELIEF VALVE, EXPLODED VIEW.

INDEX NO.	PART NO.	NOMENCLATURE	SOURCE CODE	QTY.	USABLE ON CODE
		MODEL CGE-06-3-002-1*	A		
		MODEL CGE-06-3V-002-1*	B		
		MODEL CGE-06-2-002-1*	C		
		MODEL CGE-10-3-002-1*	D		
		MODEL CGE-10-3V-002-1*	E		
		MODEL CGE-10-2-002-1*	F		
1	▲154020	"O" RING		2	A, B, C
	▲154024	"O" RING		2	D, E, F
2	▲154006	"O" RING		2	
3	174638	SCREW		4	
4		NAMEPLATE		1	
5	36212	SCREW		1	
6	▲381908	GASKET & WIRE S/A		1	
7	353860	SCREW		1	
8	353859	CLAMP		1	
9	10359	SCREW		4	
10	373971	COVER		1	
11	253722	SCREW		1	
12	▲164538	SEAL		1	
13	▲373972	GASKET		1	
14	344966	SCREW -11 DESIGN		2	
	126017	SCREW -12 DESIGN		2	
15	233107	LOCK WASHER -11/12 DESIGN		2	
16	6453	FLAT WASHER -12 DESIGN		2	
17	942299	FLAPPER S/A -11 DESIGN		1	
	397419	FLAPPER S/A -12 DESIGN		1	
18	373977	SPRING		1	
19	102671	RETAINING RING		1	
20	377012	NOZZLE (0.047 IN. Orifice) (3000 PSI UNIT ONLY)		1	A, B, D, E
	390307	NOZZLE (0.055 IN. Orifice) (2000 PSI UNIT ONLY)		1	C, F
21	112201	SCREW		2	
22	122433	SCREW		1	
23	352641	NUT		1	
24	373533	FRAME		1	
25	346773	COIL		1	
26	▲154006	"O" RING		1	
27	9706	SCREW		2	
28	68905	LOCKWASHER		2	
29	377773	ADAPTER S/A		1	
31	942298	PLUNGER & GUIDE S/A -11 DESIGN		1	
	401606	GUIDE -12 DESIGN		1	
32	▲153950	"O" RING		1	
33	942298	PLUNGER & GUIDE S/A -11 DESIGN		1	
	389541	PLUNGER -12 DESIGN		1	
34	▲401537	GLYD RING SEAL		1	
35	▲154004	"O" RING		1	
36	390308	SPACER (2000 PSI UNIT ONLY)		1	C, F
37	2281	SPRING		1	
38	290057	PISTON		1	
39	92733	RETAINING RING		1	
40	379947	SEAT		1	
41	▲154005	"O" RING		1	
42	379948	CHECK VALVE		1	
43	113559	SPRING		1	
44	375745	WASHER		1	
45	1031	SCREW		4	A, B, C
	1073	SCREW		4	D, E, F
46	88954	RETAINING RING		1	
47	281670	FILTER SCREEN		1	
48	346344	PLUG		1	
49	▲154124	"O" RING		1	
50	401605	NEEDLE VALVE		1	
51	7076	PLUG		1	
52	292564	RESTRICTION PLUG		1	D, E, F

FIGURE 1. REMOTE ELECTRICALLY OPERATED RELIEF VALVE, EXPLODED VIEW. (Cont'd)

INDEX NO.	PART NO.	NOMENCLATURE	QTY.	USABLE ON CODE
53	285601	SEAT	1	
54	113000	PLUG	1	
55	7074	PLUG	1	
56	277596	PLUG	1	
57	113000	PLUG (-11 DESIGN)	1	
	346344	PLUG (-12 DESIGN)	1	
58	▲ 154124	"O" RING (-12 DESIGN)	1	
59	7075	PLUG	1	
60	389540	COVER (CGE-06-1*)	1	A, B, C
	389539	COVER (CGE-10-1*)	1	D, E, F
61	▲ 199813	"O" RING	1	A, B, C
	▲ 170160	"O" RING	1	D, E, F
62	▲ 175943	"O" RING	1	
63	▲ 154139	"O" RING	1	
64	2077	SPRING	1	A, C
	291822	SPRING	1	D, F
	291821	SPRING (HI-VENT)	1	E
65	184458	SPRING (HI-VENT)	1	B
66	343154	PISTON	1	A, B, C
	379942	PISTON	1	D, E, F
67	343153	SEAT	1	A, B, C
	379941	SEAT	1	D, E, F
68	201408	ROLLPIN	1	
69	7075	PLUG	2	
70	381318	RESTRICTION PLUG	1	A, B, C
71	▲ 154000	"O" RING	1	A, B, C
72	160571	ROLLPIN	1	
73	374126	BODY	1	A, B, C
	377006	BODY	1	D, E, F
	▲ 919696	GASKET KIT	1	

FIGURE 1. REMOTE ELECTRICALLY OPERATED RELIEF VALVE EXPLODED VIEW.

SECTION I - INTRODUCTION

1-1. REFERENCE MATERIAL. Installation dimensions are not contained in this manual. Refer to installation drawing 511030 for that information.

1-2. KITS. Gasket kit 919696 contains all the seals necessary to service the units. It is recommended that "O"rings and gaskets be replaced at each overhaul.

SECTION II - OVERHAUL

2-1. UNIT REMOVAL.

WARNING

Turn off all electrical power and relieve hydraulic pressure. Block any load that could generate pressure.

A. Remove the unit from the system.
B. Cap all system openings to prevent contamination.

2-2. SPECIAL TOOLS. The following special tools are required:

A. Torque wrench rated in LBS.IN. range 0-100.
B. Test stand mounting plates. Vickers part CGEM-06-10 (Use for Model CGE-06) CGEM-10-10 (Use for Model CGE-10).
C. Power supply rated at: Input 115AC50/60 Hz: Output 0-400 DC MA. Vickers EMCS-C-BB-10 Power Supply part number 750897.
D. Milliammeter rated at 0-500 DC MA.
E. Test stand capable of providing the required hydraulic flow. See Section III, Test Procedure.
F. 0.010 and 0.002 stainless steel shim stock or feeler gage.
G. Depth micrometer capable of measuring 1 to 2 inches or flapper alignment tool part number 942300 (available from Vickers). Tool details are included in this manual. See Figure 5.

2-3. IMPROVISED TOOLS. No improvised tools are required for overhaul.

2-4. DISASSEMBLY. Periodic maintenance of the valve will generally not require disassembly to the extent described here. However, the sequence can also be used as a guide for partial disassembly. In general, disassembly is accomplished in the item number sequence shown in Figure 1. Special procedures are included in the following steps:

NOTE

Discard and replace all "O"rings removed during disassembly.

A. Thoroughly clean the exterior of the valve.
B. The valve is full of fluid, so hold it over a container when the cover (10, Figure 1) is removed.
C. Remove parts (1) thru (19) according to numerical sequence except, loosen screw (14) to allow the compressed spring (18) to be relieved gradually.
D. Slide the coil (25) over the nozzle (20) and use a 5/16 open end wrench to remove nozzle (20). Turn nozzle counter-clockwise to remove.

CAUTION

Do not pull the wires when removing coil bushing (25) and "O"ring (26) from cover (60).

E. Remove parts (21) thru (29) and (31) thru (38). Screw (22) and nut (23) need not be removed from frame (24) unless screw threads show evidence of damage.

NOTE

Spacer (36) is used only in units Model CGE-06/10-2-002-1*.

F. Remove parts (39) thru (44). The operation of the check valve may be determined by observing the action of the spring. Use a suitable tool to depress the check valve (42) and let it return against the seat.
G. Remove four (4) screws (45) and separate pilot cover from body (73).

CAUTION

Do not clean filter screen (47) with a metal scribe or pick.

H. Remove parts (46) thru (59) from cover (60). Restriction plug (52) is used on CGE-10 units only.

J. Remove and discard "O"rings (61) thru (63).
K. Remove parts (64) thru (67). Spring (65) is used only in units Model CGE-06-3V-002-1*. Do not remove seat (67) unless inspection of piston (66) reveals damage to the piston seating surface.

NOTE

Do not remove rollpin (72) in the following step unless damaged. The mounting surface can be scored during removal. If removal is necessary, check surface for burrs and flatness before installation of a new rollpin.

L. Remove parts (68) thru (72) from body (73).

2-5. CLEANING. All parts must be throughly cleaned and kept clean during inspection and assembly. The close tolerance of the servo portion of the valve makes this requirement more stringent than usual. Clean all removed parts, using a commercial solvent that is compatible with the system fluid. Compressed air may be used in cleaning the valve, but it must be filtered to remove water and contamination. Clean compressed air is particularly useful in cleaning the spool orifices and body passages.

CAUTION

Do not stone edges of plunger (33, Figure 1) or piston (66).

2-6. INSPECTION, REPAIR, AND REPLACEMENT. Check that all internal passages are clean and unob-

structed. Examine all mating surfaces for nicks and burrs. Minor nicks and burrs can be removed with an India stone, or crocus cloth. If unit has operated in a contaminated system, all internal passages of cover (60) must be thoroughly flushed with clean solvent.

CAUTION

> Reliable operation throughout the specified operating range is assured only if genuine Vickers parts are used. Sophisticated design processes and material are used in the manufacture of our parts. Substitutions may result in early failure.

A. Inspect nozzle (20) for damaged threads. Replace the part if threads are damaged. Inspect the orifice face of nozzle for evidence of nicks or scratches. If the orifice size is distorted, or face is erroded, replace the part.

NOTE

> Two nozzle sizes are available:
> 1. 0.047 inch diameter hole for CGE-06/10-3 and 3V
> 2. 0.055 inch diameter hole for CGE-06/10-2

B. Inspect all screws for evidence of damaged threads. If threads are damaged, replace the screws.

C. Inspect the flapper subassembly (17) for fractured tines, distortion, and loose rivets. If rivets are loose, replace the part. If tines are fractured, replace the part. If part is distorted, straighten and square up damaged portion. If the top of flapper is nicked or burrs are evident around the rivets, remove the nicks and burrs using an India stone. Finish the repair by polishing the top of the flapper using 500 grit paper placed on a flat surface.

D. Inspect springs (18, 37, 43, 64, and 65) for damaged coils. Replace springs if coils are damaged. Inspect springs for distortion. The ends of the springs shall be parallel to each other. Replace springs if distorted.

E. Inspect frame (24) for distortion. Correct to a square condition. Inspect adapter S/A (29) for evidence of damage. Replace part if threads are damaged.

F. Perform a continuity test on coil (25). Resistance values should range from 18 to 22 ohms. This test is superficial but a more rigorous test requires special equipment. Replace coil if it does not meet the established standard.

G. If a new plunger (33) is required, use a three (3) cornered India stone to break the feather edge of balancing grooves. Use 500 grit polishing paper lightly on the outside diameter of plunger. Wash the plunger in clean solvent.

H. If seat (67) was removed, make sure hole in body is clear.

J. Ascertain that both the drain hole and balance hole in piston (66) is clear.

K. Inspect mounting surfaces of cover (10), adapter S/A (29), cover (60), and body (73) for evidence of nicks and scratches. Remove nicks and scratches using an India stone and/or polishing paper.

NOTE

> Use polishing paper on a clean, flat surface.

2-7. ASSEMBLY. Replace the gaskets and "O"rings removed from the unit with those supplied in the gasket kit part number 919696. Lubricate "O"rings and parts, using clean system fluid to facilitate assembly. Assembly of the parts will be in the reverse numerical sequence. Special procedures are included in the following steps:

A. Install parts (72) thru (68) in body (73). See Figure 1. Restriction plug (70) and "O"ring (71) are used on Model CGE-06. Restriction plug and "O"ring must be installed in the port located on the centerline of body (73). If the parts are installed in the wrong port, the pilot drain will be restricted and failure may result.

B. Install parts (67) thru (64). Spring (65) is used only in Model CGE-06-3V-002-1*. If seat (67) was removed, install new seat. See paragraph 2-4.K.

NOTE

> Slide piston (66) back and forth in the body. Make sure the movement is free and without bind.

C. Install "O"rings (63) thru (61).

NOTE

> In the following step, deviate slightly from the item number sequence by connecting cover (60) to body (73). This provides a unit which is easier to assemble.

D. Install filter screen (47) and retaining ring (46) into cover (60). See Figure 1. Secure cover (60) to body (73) using screws (45). Tighten screws securely. Use a suitable tool to cause piston (66) to move. The movement must be free without evidence of bind. If piston bind occurs, loosen screws (45) and reposition cover or body. Tighten screws (45) and recheck piston movement.

E. Install parts (59) thru (51) into cover (60). Install seat (53) with hole in the outside diameter pointing toward nameplate (4). Refer to cross-section view (Figure 1). Restriction plug (52) is used on CGE-10 models only.

F. Install parts (50) thru (48). Thread the needle valve (50) into the cover (60) to a depth of 11/16 inch (0.687) below surface of cover (60). Install plug (48) with "O"ring (49) hand tighten into cover. Final adjustment of needle valve will be made during test, paragraph 3-2.

G. Install parts (44) thru (39) if they were removed. Lubricate "O"ring (41) before assembling it on seat (40). Depress check valve to verify action. No binding should occur.

H. Install parts (38) thru (27). Place cover (60) on its side to gain access to piston (38) bore.

1. Assemble piston (38) and spring (37) and install into bore.
2. Reposition cover (60) to obtain vertical bore

position.

3. Lubricate plunger (33) and install into bore as shown in Figure 1. Rotate plunger through 360° while moving in and out. This checks the concentricity of the spool and the cover. No binding should occur. Remove the plunger.

4. If spacer (36) is used (Models CGE-06/10-2), remove rough edges from outside diameter of spacer with an India stone. Place spacer (36) in the bore. Seat the spacer with plunger (33). Refer to Figure 1 cross section view. Remove plunger from bore.

5. Install "O" ring (35) and glyd ring (34) on plunger (33). Install "O" ring (32) on guide (31). Assemble guide over plunger (33) chamfered edge first.

6. Insert plunger (33) and guide (31) into bore as an assembly.

7. Install adapter S/A (29) to cover (60). Use lockwasher (28) and screw (27). Orient adapter (29) so check valve opening is not covered. Hand tighten both screws.

J. Assemble pilot stage parts (26) thru (14) refer to Figures 2 and 3 as required.

1. Assemble screw (22) to frame (24) and attach nut (23). Nut is self-locking type. Tighten nut until all end play is removed, but screw and nut together must be free to turn.

2. Thread screw (14) thru washers (15) and (16) approximately two (2) turns into frame (24).

5. Insert nozzle (20) thru frame (24) and thread it into cover (60). Use a 5/16 open end wrench to tighten the nozzle securely.

6. Tighten screws (21) to secure frame against cover (60).

7. Position adapter S/A (29) to prevent plunger (33) bind, and tighten screws (23) securely.

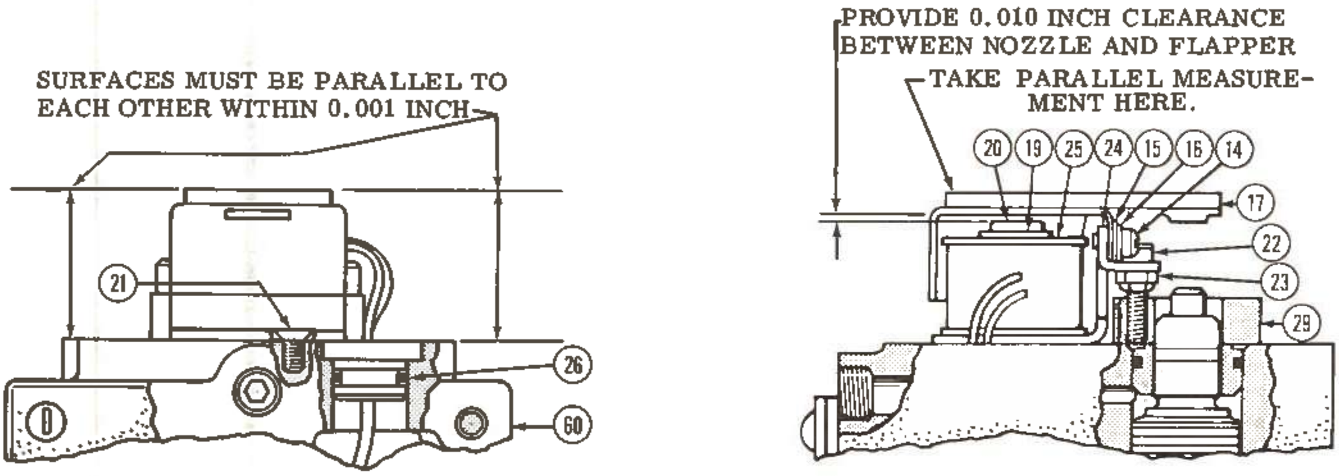
8. With frame (24) and adapter S/A (29) tightened to cover, adjust screw (22) until the frame, onto which flapper (17) mounts, is square to cover surface.

9. Assemble coil (25) over nozzle (20) with coil wires toward cover (60). Use retaining ring (19) to secure coil (25).

10. Position flapper subassembly (17) over nozzle and coil onto frame (24). See Figure 2. Tighten screws (14) to a snug condition.

NOTE

The flapper to nozzle adjustment is very critical. Two methods may be used to accomplish this adjustment. The first method shown is more involved and requires familiarity with measuring equipment. The second method utilizes a special flapper alignment tool part number 942300. This tool is available from Vickers at a nominal cost. Tool assembly prints are shown in Figure (5) for the customers convenience.



14. Screw
15. Washer
16. Lockwasher
17. Flapper subassembly
19. Retaining ring
20. Nozzle
21. Screw
22. Screw
23. Nut
24. Frame
25. Coil
26. "O" Ring
29. Adapter
60. Cover

FIGURE 2. PRELIMINARY FLAPPER TO NOZZLE ADJUSTMENT

3. Assemble "O" ring (26) on bushing of coil (25). Thread leads of coil thru access hole in cover (60). Press the bushing with the "O" ring into the counter bored hole. Refer to Figures 2 and 3 for proper orientation of bushing. Wires must be positioned as shown to prevent interference with cover.

4. Thread screw (22) into adapter (29) approximately seven (7) to seven and one-half (7-1/2) turns. This will cause the frame (24) and cover (60) to interface. Make certain frame is flat against the cover. Loosely secure frame (24) to cover (60). Use screws (21).

11. Method 1. Flapper to nozzle alignment procedure.

a. Provide sufficient clearance between nozzle and flapper for insertion of a 0.010 inch shim between these two parts. Using a depth micrometer, measure the distance between the top of the flapper and the machined surface of the cover as shown in Figure 2. The top of flapper (17) and the machined surface of cover (60) must be adjusted parallel within 0.001 inch.

The flapper will probably have to be adjusted several times before the parallel condition is realized. The clearance of 0.010 inch must be maintained during this exercise.

b. Tighten screws (14) securely. Recheck parallel condition then remove the 0.010 shim.

c. Install spring (18) between flapper subassembly (17) and plunger (33). See Figure 3.

d. Insert a 0.002 inch shim between nozzle (20) and flapper subassembly (17). Adjust screw (22) to provide the required clearance. See Figure 3. Final adjustment will be made during test paragraph 3-3. Use a 3/32 (0.093) inch Allen wrench for screw (22). Remove 0.002 shim and Allen wrench.

12. Method 2. Flapper to nozzle alignment procedure.

NOTE

Remove any burrs or paint from the surface of cover (60).

a. Install flapper alignment tool (942300) as shown in Figure 4. Use the two 208569 screws provided.

b. Provide clearance between the nozzle and flapper. Insert a 0.010 inch shim between these parts. Rotate adjustment tool knob. The plunger will move inward and engage the flapper.

c. Loosen screws (14) which hold the flapper to the frame. The flapper will align with the plunger face.

d. Tighten screws (14) securely.

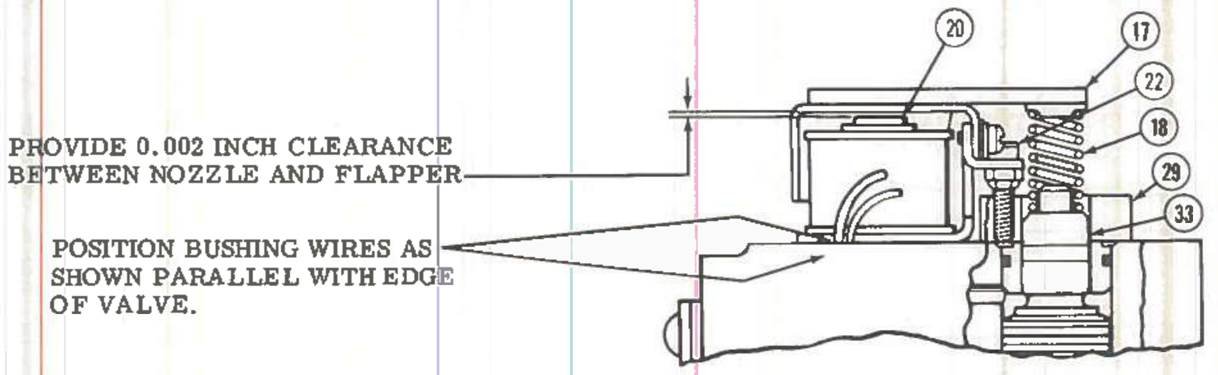
e. Remove flapper alignment tool and shim stock.

f. Install spring (18) between flapper subassembly and plunger (33).

g. Insert a 0.002 inch shim between the flapper subassembly (17) and the nozzle (20). Adjust screw (22) to provide the correct clearance. See Figure 3. Final adjustment will be made during test paragraph 3-3. Remove the shim stock.

13. Assemble parts (13) thru (9). Tighten screws (9) to a torque value of 35 to 40 pound inches. Hand tighten screw (11).

14. Install "O" rings (1) and (2). Parts (3) thru (8) will be installed after the unit has been tested as outlined in Section III.



17. Flapper subassembly
18. Spring
20. Nozzle
22. Screw
29. Adapter
33. Plunger

FIGURE 3. DETERMINING FLAPPER TO NOZZLE CLEARANCE

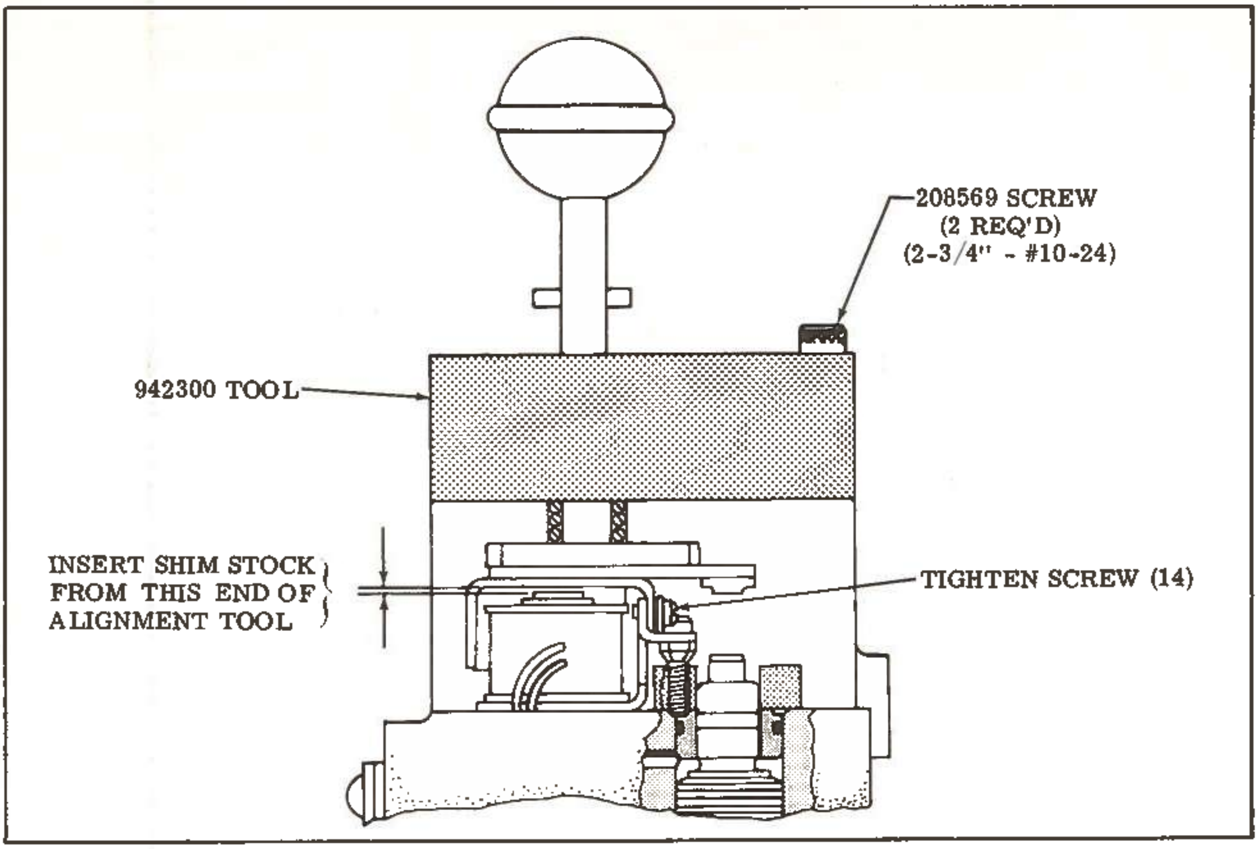


FIGURE 4. INSTALLATION OF FLAPPER ALIGNMENT TOOL (942300).

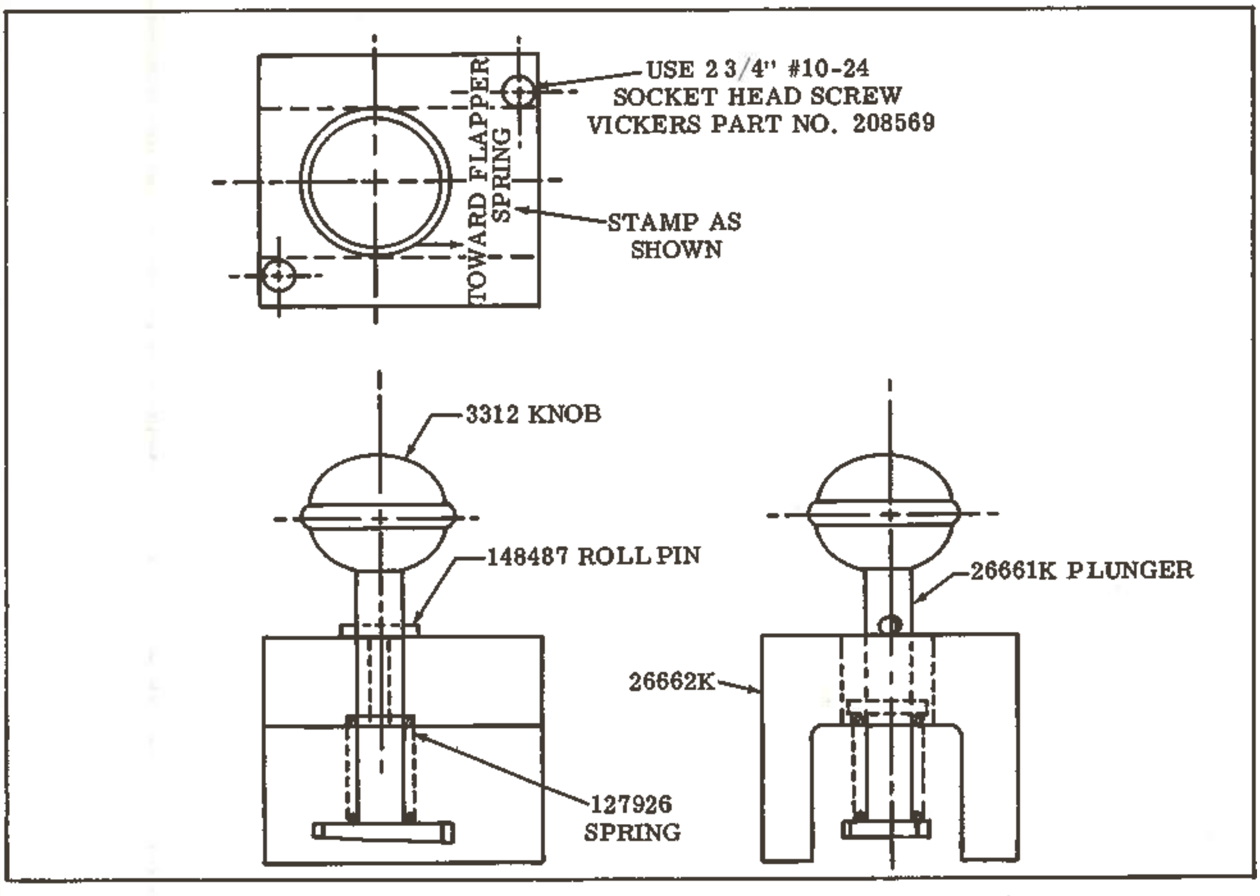
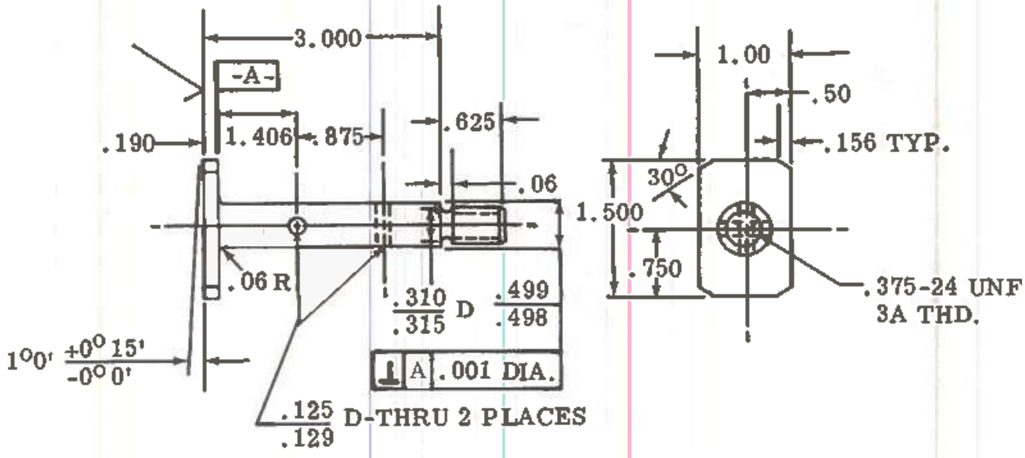
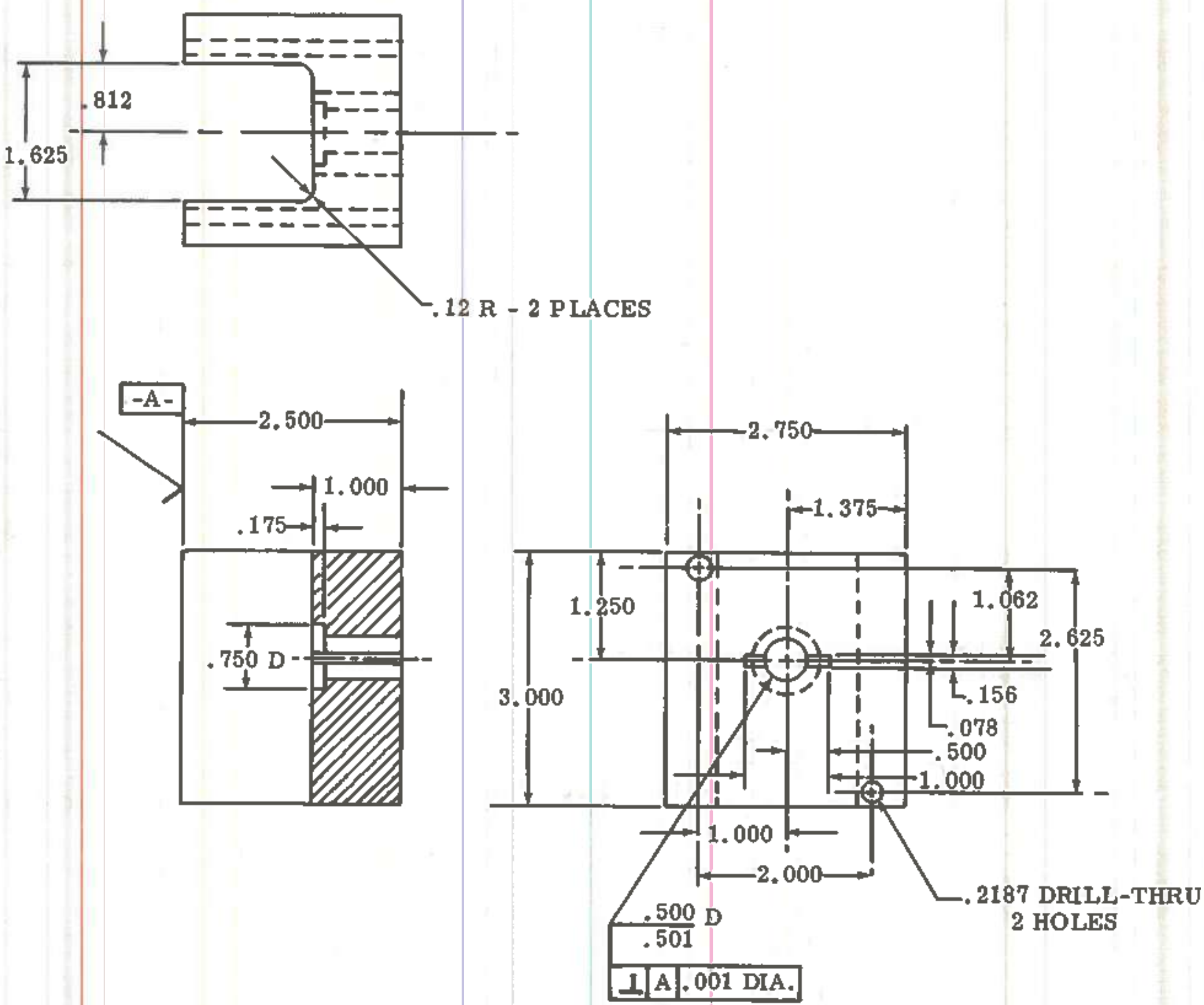


FIGURE 5. ASSEMBLY, 942300 FLAPPER ALIGNMENT TOOL.



PLUNGER 26661 K MAT'L -CARBON STEEL (1018)



BLOCK FIXTURE 26662 K MAT'L 4150-6150 STEEL ROCKWELL "C" 50 MIN.

FIGURE 5. DETAILS FOR 942300 FLAPPER ALIGNMENT TOOL.

SECTION III - TEST PROCEDURE

TEST CONDITIONS

Hydraulics:

Fluid Medium	DTE light oil or equivalent
Fluid Temperature	120 $\pm$ 5° F
Maximum Pressure	2500 PSI CGE-06/10-2-002 -1*.
	3500 PSI CGE-06/10-3-002 -1*.
Test Volume	Use 18 GPM for the CGE-06 and 28 GPM for CGE-10.

Electrical:

An adjustable current source from zero (0) to 400 milliamperes (MA) is required. Vickers EMCS-C-BB-10 Power Supply part numver 750897 is recommended. Installation information for the EMCS is shown on drawing 521550.

3-1. TEST.

NOTE

Systems using proportional filtration tend to contaminate the pilot valve orifice. An external full flow filter for the pilot stage oil may be used. Units having the external full flow feature are designated by an -S3 suffix added to the model code. -S3 units have the pilot pressure inlet passage of the main stage body plugged. Pressurized oil can be obtained from one of the gage connections, (plug 69 Figure 1), or from another source in the system. After filtering externally, the oil line connects at plug location (55) Figure 1. This directs filtered oil to the pilot stage of the CGE valve. To clairify, -S3 in the model code indicates only that the body is plugged. The external filtration system is the users responsibility.

A. Before mounting the assembled valve for test, manually move piston (66, Figure 1) to full stroke with a screwdriver or similar tool. If piston (66) hangs up or binds, refer to paragraph 2-7. D.

NOTE

Gasket mounted units require a suitable subplate. A CGE subplate properly piped is recommended. See Figure 6. If the valve is replacing a standard CG-** valve, on a standard CG-** subplate, it must be externally drained. Remove external drain plug (59, Figure 1) and install a pipe directly to tank.

NOTE

A sample hydraulic and electrical circuit is shown in Figure 7. Modify an existing test stand or obtain necessary components to assemble the test circuit.

B. Connect valve to the test circuit and attach power supply (13, Figure 7). The connections can be made without regard to polarity.

C. Set dither adjustment on power supply (13) to minimum.

D. Turn power supply current control knob to zero (0).

CAUTION

In the following step, if milliammeter (12) reads in reverse, reverse the meter connecting wires.

E. Refer to sample test circuit Figure 7. during the following steps:

1. Open globe valve (1).
2. Close globe valve (10).
3. Close needle valve (9).

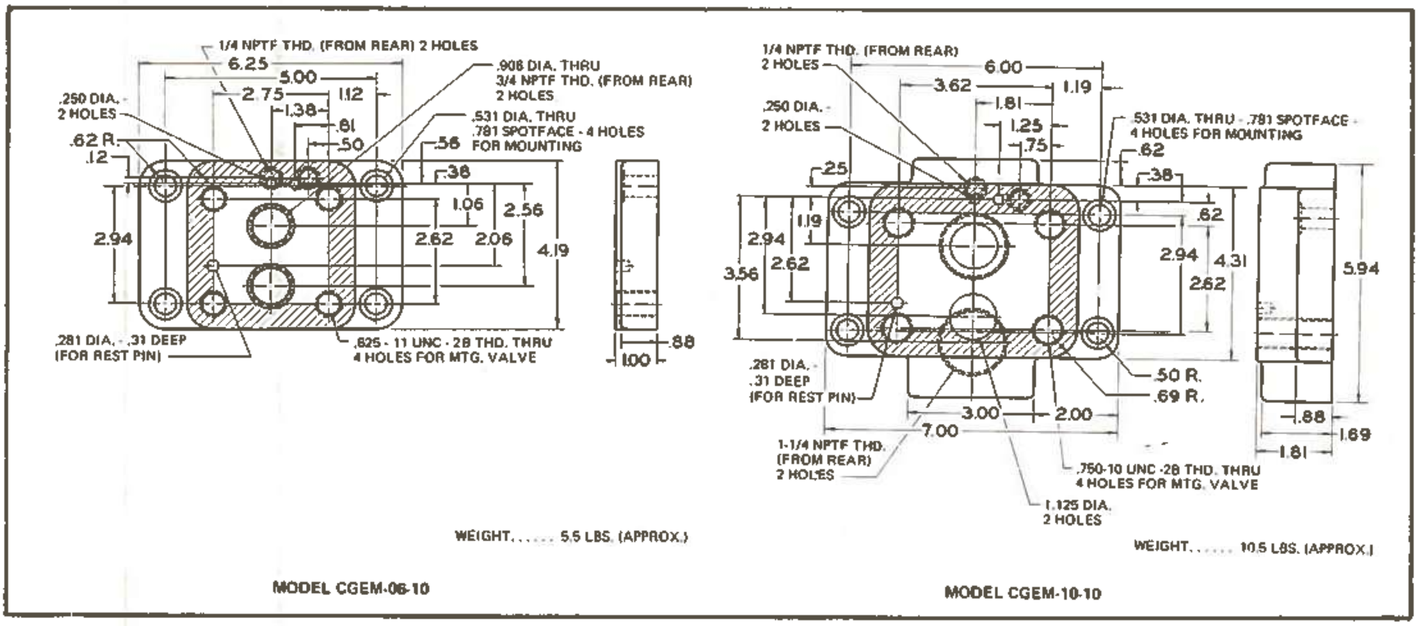


FIGURE 6. SUBPLATES FOR GASKET MOUNTED UNITS.

4. Crack open needle valve (6).

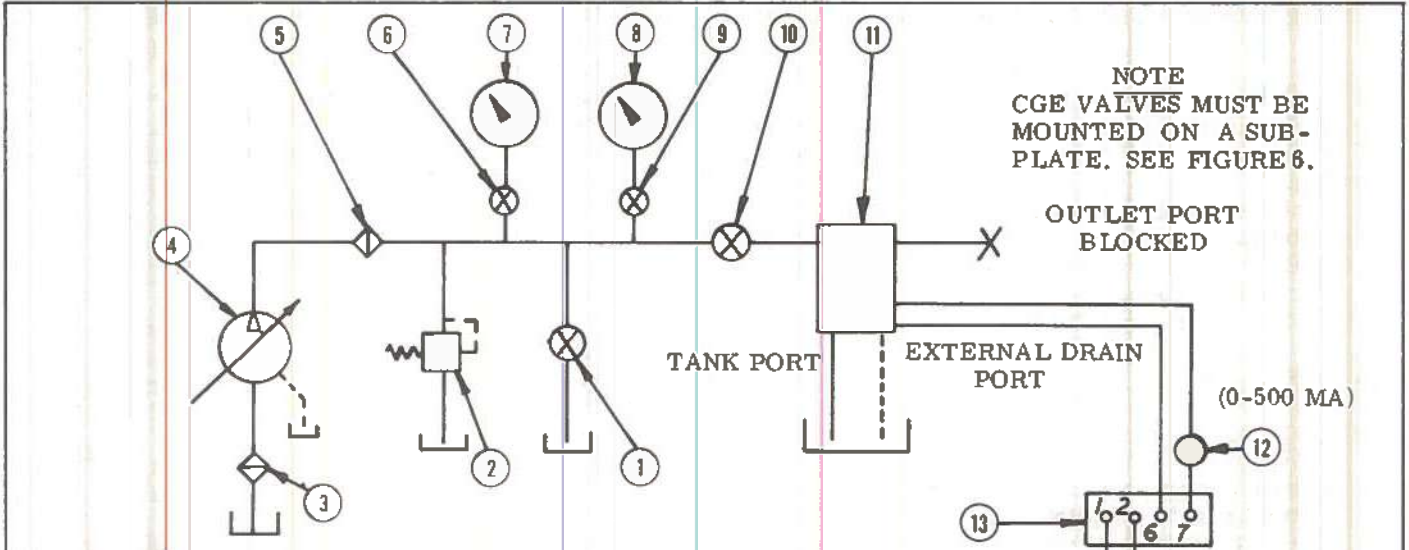
5. Turn on hydraulic circuit and adjust relief valve (2) 500 PSI above maximum test pressure. See Table 1. Close globe valve (1) as relief valve (2) adjustment is performed.

6. Open globe valve (10).

3-3. LOW PRESSURE TEST AND ADJUSTMENT.

A. Set current control knob on power supply (13, Figure 7) to zero (0) and observe pressure gage (7). If the reading is 500 PSI or less, open needle valve (9).

Pressure gage (8) must read below the minimum pressure shown in Table 1. If the pressure is not below this limit, perform an adjustment of the flapper orifice as follows: If the minimum pressure is below the limit shown, proceed to section 3-4. Linearity check and adjustment.



1. Globe valve
2. Test stand relief valve
3. Inlet filter 25 micron
4. Variable delivery pump
5. Inline filter 10 micron
6. Needle valve
7. Pressure gage 0-4000 PSI
8. Pressure gage 0-500 PSI
9. Needle valve
10. Globe valve
11. Electrical relief valve under test
12. Ammeter 0-500 DC MA.
13. Power supply (Vickers Pt. No. 750897 or equivalent). Must be capable of delivering 0-400 DC MA. thru a 20 Ohm inductive load.

FIGURE 7. SAMPLE TEST CIRCUIT.

3-2. HIGH PRESSURE TEST AND ADJUSTMENT.

NOTE

Valve will be unstable until entrained air is removed. It will be necessary to apply 400 MA of current for one (1) full minute in order to purge all air from the valve.

A. Adjust power supply (13) to 400 MA as read on milliammeter (12). Pressure gage (7) should indicate within the maximum pressure range shown in Table 1.

B. If the gage reading differs from the pressure indicated in Table 1, remove plug (48, Figure 1) and adjust needle valve (50) for the correct pressure reading. Use a 0.156 (5/32) Allen wrench. Hand tighten plug (48) in place. Check the maximum pressure again to verify adjustment.

Model	Min. Pressure	Max. Pressure
CGE-06-2-002-1*	100 PSI	2000-2100 PSI
CGE-10-2-002-1*		
CGE-06-3-002-1*	150 PSI	3000-3100 PSI
CGE-10-3-002-1*		
Hi-Vent valves have pressure settings approximately eighty (80) PSI higher than shown.		

Table 1. Minimum and Maximum Pressure Ranges

CAUTION

Needle valve (9) must be closed for test pressures greater than 500 PSI, or damage to pressure gage (8) will result.

1. Open globe valve (1), close globe valve (10).

CAUTION

Oil under pressure will escape from the cover when screw and seal are removed. Use a suitable shield to deflect the flow of oil away from the test operator.

2. Remove screw and seal (11, 12, Figure 1) from the cover.

3. Insert a 0.093 (3/32) Allen wrench thru the shield into the valve opening and engage screw (22). Hold the shield against the cover while making the low pressure adjustment.

4. Open globe valve (10, Figure 7) and close globe valve (1).

5. Adjust screw (22, Figure 1) until a minimum

pressure of 140 PSI is obtained.

6. Open globe valve (1, Figure 7) close globe valve (10) and remove the adjustment wrench from the valve cover. Hand tighten screw and seal (11, 12, Figure 1) into the cover.

7. Open globe valve (10, Figure 7) close globe valve (1). Verify the minimum pressure reading.

8. Close needle valve (9).

3-4. LINEARITY CHECK AND ADJUSTMENT.

NOTE

The high and low pressure adjustments interact, therefore, more than one high and low pressure adjustment may be required before linearity (tracking) occurs.

A. Cycle valve from zero (0) current to full current (400MA) five (5) times.

B. Check pressure gage (7) for maximum pressure at 400 MA. Reduce current to zero (0) and check the low pressure setting. Repeat the high and low pressure adjustment procedure (paragraph 3-2 and 3-3) until correct pressures are obtained.

C. Tighten plug and "O" ring (48, 49, Figure 1). Tighten screw and seal (11, 12).

D. Slowly apply current to the valve under test until 200 PSI is reached. The current reading shall not exceed the MA shown in Table 2. Continue to apply current until the PSI shown in Table 2 is obtained. Current at this point shall be 220 ± 20 MA. Continue the application of current until 400 MA is read on the milliammeter then reduce current slowly until the PSI shown in Table 2 is reached. The current shall be within 25 MA of previous reading. Return current control knob to zero (0). During application and removal of current, there must be no erratic pressure fluctuations or excessive noise in the valve.

MODEL	MA	PSI
CGE-06/10-2*-002-11/12	120	1000
CGE-06/10-3*-002-11/12	75	1500

Table 2. Current Vs. Pressure - 2000/3000 PSI Valves

3-5. Turn off hydraulic power. Open globe valve (1) to relieve system pressure. Close globe valve (10).

3-6. Remove electrical wiring connections from the valve under test.

3-7. Remove valve from the test circuit.

3-8. After the unit has been successfully tested, install parts (8, Figure 1) thru (3). The coil wires must be secured by clamp (8) and screw (7).

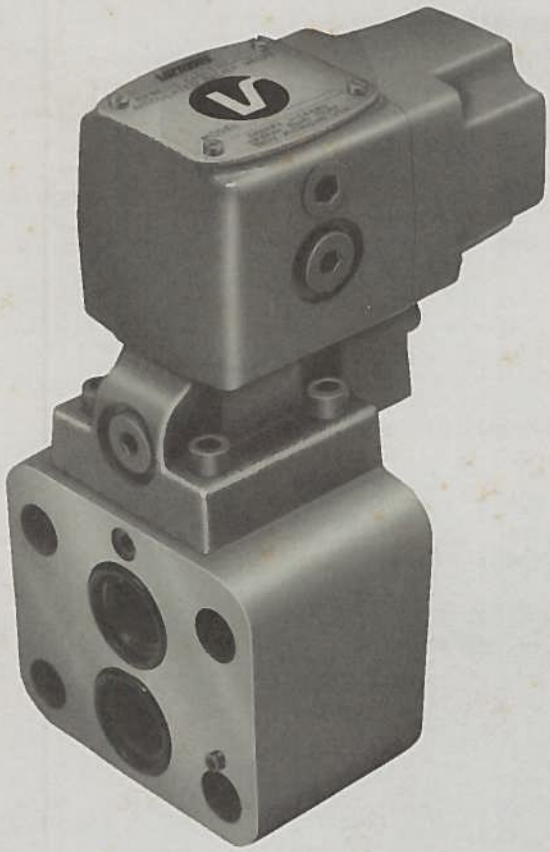
LITHO IN U.S.A.

VICKERS®
A TRINOVA COMPANY

Overhaul Manual

ELECTRICALLY MODULATED RELIEF VALVE

(F3)-CGE-06-3(V)-2* (S*)
(F3)-CGE-10-3(V)-2* (S*)



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MODEL CODE BREAKDOWN

(F3)-CGE--3(V)-22(S*)**

- **(F3)** — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- **C** — RELIEF VALVE
- **G** — SUBPLATE MOUNTED
- **E** — REMOTE ELECTRICALLY MODULATED
- ****** — VALVE SIZE
  - 06 - 60 SERIES (3/4" NOM.)
  - 10 - 100 SERIES (1-1/4" NOM.)
- **3** — PRESSURE RATING (PSI MAXIMUM)
  - 1 - 1000 (70 bar)
  - 3 - 3000 (210 bar)
- **(V)** — "V" - OPTIONAL HIGH VENTING FEATURE. OMIT IF NOT REQUIRED. (FOR 3000 PSI (210 bar) PRESSURE MODELS ONLY)
- **22** — DESIGN
- **(S*)**
  - S6 - EXTERNAL 35 MICRON PILOT FILTER (FURNISHED BY CUSTOMER)
  - S7 - VITON SEALS WITH 35 MICRON FILTER (EARLY MODELS)
  - S8 - VITON SEALS ONLY (EARLY MODELS)

TABLE 1. MODEL CODE

Section I - INTRODUCTION

A. PURPOSE OF MANUAL

This manual describes the basic operational characteristics, provides service and overhaul information for the Vickers CGE-06/10-*-2*-(S*) Remote Electrically Modulated Relief Valves.

The information contained herein pertains to the latest design series as listed in Table 1.

B. GENERAL INFORMATION

1. Related Publications - Service parts information and installation dimensions are not contained in this manual.

The parts and installation drawings listed in Table 2 are available from any application office or from:

Vickers, Incorporated
Technical Publications
1401 Crooks Road
Troy, Michigan 48084

2. Model Codes - Variations within each basic model series are covered in the model code. Table 1 is a complete breakdown of the code covering these units. Service inquiries should always include the complete unit model code number as stamped on the nameplate.

MODEL SERIES	PARTS DRAWING	INSTALLATION DRAWING
CGE-06-*-22-(S*)	I-3695-S	511040
CGE-10-*-22-(S*)	I-3696-S	511040

Table 2.

Section II - DESCRIPTION

A. GENERAL

Assembly of a typical remote electrically modulated relief valve is shown in figure 1. In general, the valve consists of three basic parts, a main stage, an intermediate body and the electrically modulated pilot. The main stage is similar to the standard relief valve. The intermediate body contains standard relief valve pilot parts to provide manual adjustment and has a mounting pad which accepts CETOP3 components. The electrically modulated pilot is machined to fit the CETOP3 pad and contains a flapper valve assembly, a blocking valve, and a ball type check valve.

B. APPLICATION

The new valve series provides a self-contained unit that modulates system pressure electrically over a wide range without external feedback devices.

The valve has the ability to control system pressure from any distance or location. Modulating signals may be derived from potentiometers, analog computers, power supplies or any other source that will provide the necessary drive current for the pilot stage. A current of 0-500 milliamperes (mA) is required to modulate the valve.

Power supply EMCS-*-30 was specifically designed for control of this type valve. The EMCS is not limited to potentiometer command only but can easily be adapted to remote control devices. For information on EMCS, refer to installation drawing 521557.
from Technical Publications, Troy, MI 48084.

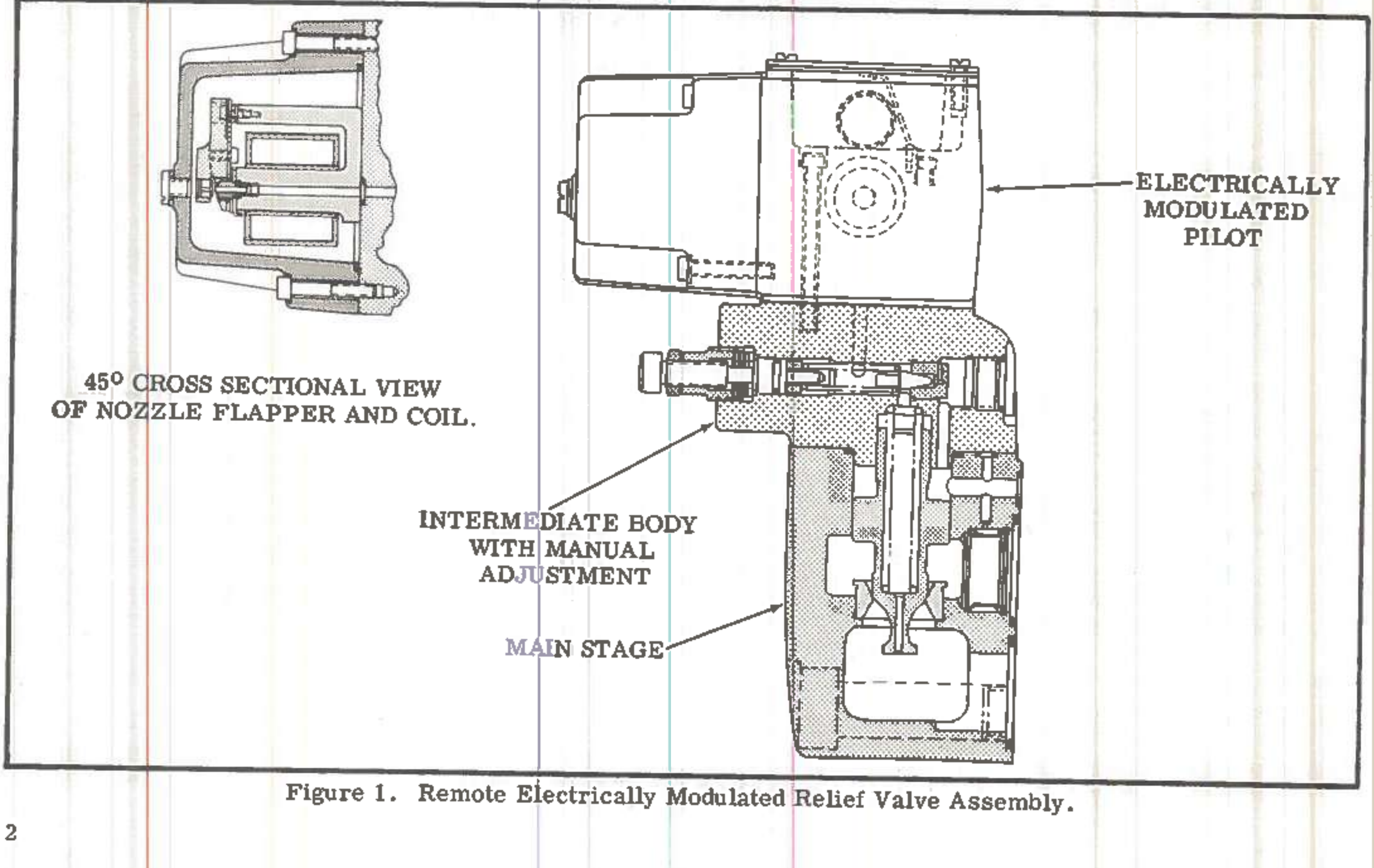


Figure 1. Remote Electrically Modulated Relief Valve Assembly.

A. ELECTRICALLY MODULATED PILOT

1. FLAPPER, NOZZLE AND COIL: The flapper nozzle is analogous to a poppet/seat with a spring type of control in that it is a force balance system. When current is applied to the coil, the resultant magnetic force pulls the flapper toward the pole piece. This results in a smaller hydraulic gap (orifice) and a build up of pressure at the upstream side of the valve. This increasing pressure produces a force which opposes the magnetic force and a balance is achieved with pressure being approximately proportional to current. Refer to figure 2.

2. DUAL GAP CONCEPT: The hydraulic and magnetic gaps are both adjustable. This allows optimum trim of both gaps with a resulting improvement in stability and contamination tolerance.

3. DAMPENING SHIM: The dampening shim prevents flapper oscillations. It is not used in 3000 PSI models.

4. BLOCKING VALVE: The blocking valve is used to shut off flow to the flapper nozzle. This allows complete manual control during machine flushing and at start-up. To close the valve, shut down the machine and relieve all pressure. Remove the blocking valve access plug from the side of the pilot valve body. Remove and reverse the button. When the access plug is reinstalled, the spool shifts and flow is blocked to the nozzle.

5. DRAIN CONNECTION

CAUTION

The pilot valve drain connection must be piped directly to the reservoir and terminate below the oil surface. A 0.5625-18, UNF-2B straight thread port, (for 3/8" tubing), is provided on the side of the pilot valve for this purpose.

6. SECONDARY FILTER SCREEN: A 100 micron screen located close to the nozzle helps prevent plugging of the flapper orifice. To change or clean this screen, remove the blocking valve spool. The screen is located in the end of the spool. See figure 2.

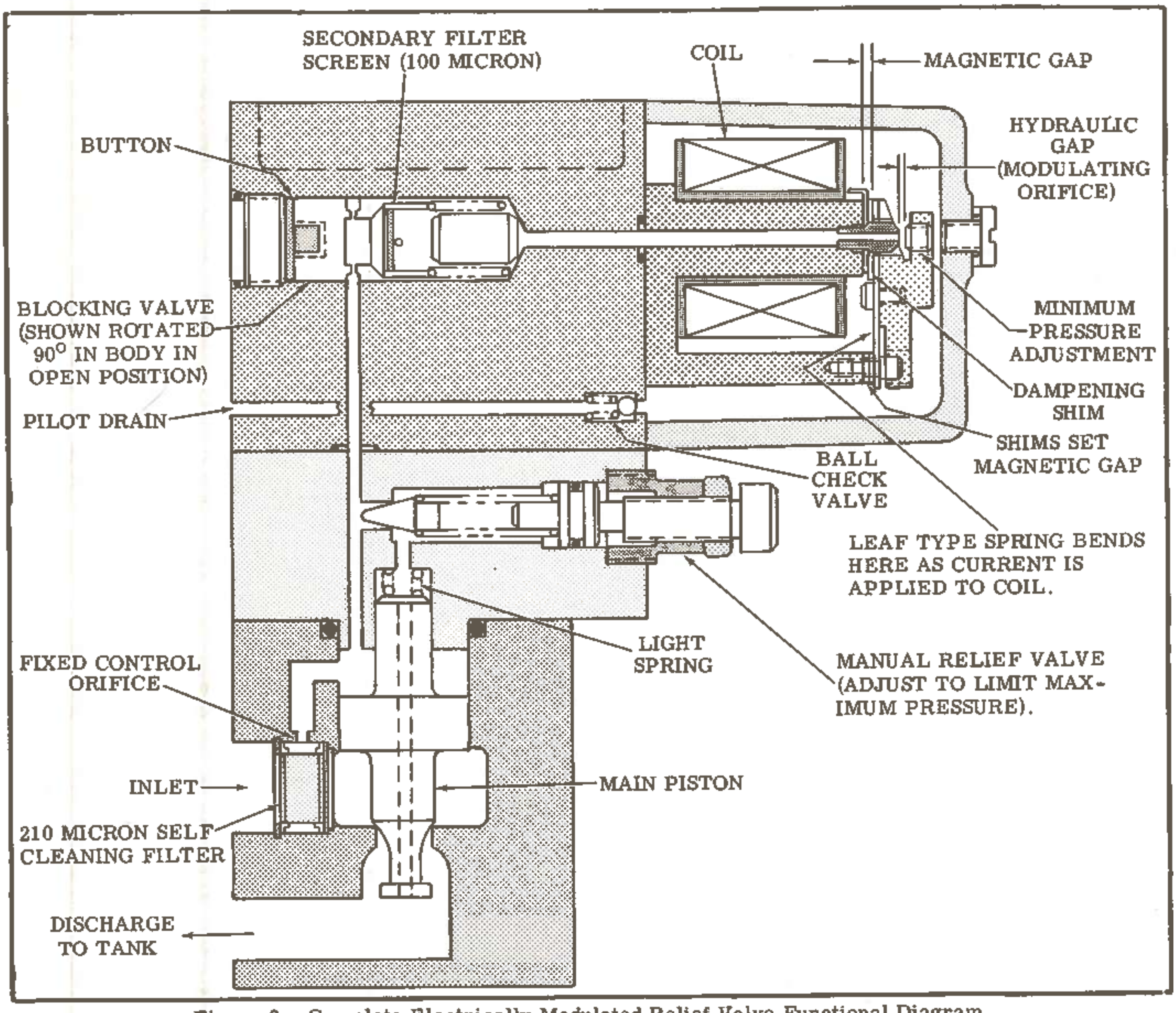


Figure 2. Complete Electrically Modulated Relief Valve Functional Diagram.

7. BALL CHECK VALVE: A ball check valve is used to keep the pilot valve cover full of oil during shut down. See figure 2.

B. INTERMEDIATE BODY

The intermediate body adapts the relief valve main stage to the electrically modulated pilot valve. A poppet and spring arrangement located in the intermediate body provides manual adjustment of relief pressure when the pilot valve is blocked. Normal operating procedure is to adjust the manual relief above the maximum pressure excursion of the electrically modulated pilot stage. This prevents interaction of the poppet and flapper and provides a manually adjusted upper limit for the valve.

C. MAIN STAGE

The main stage consists of a body, piston, spring (s), primary filter screen, and seat. A control orifice is drilled in the body instead of the piston. The primary filter screen (210 micron self cleaning type) protects the drilled orifice and pilot stage from contaminants.

D. THEORY OF OPERATION

NOTE

Refer to figure 2 during the following discussion.

When a new CGE valve is installed into a system and the system energized; oil will flow into the inlet of the CGE valve.

The light spring holds the main piston closed against the seat until pressure below the piston builds up to about 80 PSI. The 80 PSI pressure differential lifts the piston porting oil to the reservoir. Also, the 80 PSI will cause oil to flow through the self cleaning filter screen and the control orifice, filling the open area above the piston and the valve body passages. When the body passage to the flapper nozzle is filled, the orifice developed by the flapper and nozzle develops a back pressure at the top of the piston and increases the original 80 PSI to approximately 150 PSI. The oil will continue to flow through the orifices filling the pilot cover. Pressure builds up within the cover, lifts the 5 PSI ball check from its seat and oil flows past the check into the pilot drain. The valve may be unstable until air is displaced within the pilot cover. With a new valve this displacement of air should be accomplished within one or two minutes.

The following action will take place when coil current is increased.

1. The increased current strengthens the magnetic field and attracts the flapper with a greater force toward the nozzle.

2. The modulating orifice decreases in size increasing the pressure at the upstream side of the orifice. This increase in pressure is reflected back to the top of the spool and adds to the light spring force. A higher pressure is then required at the inlet port to lift the spool.

NOTE

It can be seen from the preceeding discussion that the greater the coil current the higher the pressure developed by the valve. This condition must not be allowed to exceed the ratings of the valve. As a safety precaution, the manual adjust section of the valve can be set to this limit. Also, the electrical circuitry should be trimmed to limit the maximum pressure, (usually 500 milliamperes or less.)

Section IV - INSTALLATION AND OPERATING INSTRUCTIONS

A. INSTALLATION DRAWINGS

Installation dimensions are not contained in this manual. Refer to installation drawing 511040 for that information.

B. MOUNTING

No mounting restrictions exist. The valve may be oriented in either a horizontal or vertical position.

C. PIPING AND TUBING

1. All pipes and tubing must be thoroughly cleaned before installation. Recommended methods of cleaning are sandblasting, wire brushing and pickling.

NOTE

For instructions on pickling, refer to instruction sheet 1221-S.

2. To minimize flow resistance and possibility of leakage, only as many fittings and connections as are necessary for proper installation should be used.

3. The number of bends in tubing should be kept to a minimum to prevent excessive turbulence and friction of oil flow. Tubing must not be bent to sharply. The recommended radius for bends is three times the inside diameter of the tube.

D. HYDRAULIC FLUID RECOMMENDATIONS

GENERAL DATA

1. Oil in a hydraulic system performs the dual function of lubrication and transmission of power. It constitutes a vital factor in hydraulic system, and careful selection of it should be made with the assistance of a reputable supplier. Proper selection of oil assures satisfactory life and operation of system components.

2. Data sheet I-286-S for oil selection is available from Technical Publications, Troy, MI.

3. Oil recommendations noted in the data sheet it is based on our experience in industry as a hydraulic component manufacturer.

4. Where special considerations indicated a need to depart from the recommended oils or operating conditions, see your Vickers representative.

E. CLEANLINESS

Thorough precautions should always be observed to insure the hydraulic system is clean:

1. Clean (flush) entire new system to remove paint, metal chips, welding shot, etc.
2. Filter each change of oil to prevent introduction of contaminants into the system.
3. Provide continuous oil filtration to remove sludge and products of wear and corrosion generated during the life of the system.
4. Provide continuous protection of system from entry of airborne contamination, by sealing the system and/or by proper filtration of the air.
5. During usage, proper oil filling and servicing of filters, breathers, reservoirs, etc., cannot be over emphasized.
6. Thorough precautions should be taken, by proper system and reservoir design, to insure that aeration of the oil will be kept to a minimum.

F. SOUND LEVEL

Noise is only indirectly affected by the fluid selection, but the condition of the fluid is of paramount importance in obtaining optimum reduction of system sound levels.

Some of the major factors affecting the fluid conditions that cause the loudest noises in a hydraulic system are:

1. Very high viscosities at start-up temperatures can cause pump noises due to cavitation.
2. Running with a moderately high viscosity fluid will impede the release of entrained air. The fluid will not be completely purged of such air in the time it remains in the reservoir before recycling through the system.
3. Aerated fluid can be caused by ingestion of air through the pipe joints of inlet lines, cylinder rod packings, or by fluid discharging above the fluid level in the reservoir. Air in the fluid causes a noise similar to cavitation.

Section V - SERVICE INSPECTION AND MAINTENANCE

A. SERVICE TOOLS

1. One each of the following hollow set screw hex keys: metric, 2.5 mm, 3mm, and 4 mm - inch, 3/16, 5/16, 1/4, 1/2, and 5/8.

2. Torque wrench with adapters for above straight hex keys.

3. Internal Truarc pliers (2300).

4. Small adjustable (6") wrench.

5. Feeler gage set (inch or metric).

6. Arbor press.

B. SPECIAL TOOLS

No special tools are required for the maintenance of the valve.

C. INSPECTION

Periodic inspection of the fluid conditions and the tube or piping connections can save time-consuming breakdowns and unnecessary parts replacement. The following should be checked regularly:

1. All hydraulic connections must be kept tight. A loose connection in a pressure line will permit the fluid to leak out. If the fluid level becomes so low as to uncover the inlet pipe opening in the reservoir, extensive damage to the pump can result. In suction or return lines, loose connections permit air to be drawn into the system resulting in noisy and/or erratic operation.
2. Clean fluid is the best insurance for long service life. Therefore, the reservoir should be checked periodically for dirt or other contaminants. If the fluid becomes contaminated, the system should be drained and the reservoir cleaned before new fluid is added.
3. Filter elements also should be checked and replaced periodically. A clogged filter element results in a higher pressure drop. This can force particles through the filter which would ordinarily be trapped, or can cause the by-pass to open, resulting in a partial or complete loss of filtration.
4. Air bubbles in the reservoir can ruin circuit components. If bubbles are seen, locate the source of the air and seal the leak. (See table 3).

D. ADDING FLUID TO THE SYSTEM

When hydraulic fluid is added to replenish the system, it should always be poured through a fine wire screen (200 mesh or finer) or preferably pumped through a 10 micron (absolute) filter.

It is important that the fluid be clean and free of any substance which could cause improper operation. Therefore, the use of cloth to strain the fluid should be avoided to prevent lint getting into the system.

E. ADJUSTMENTS

No periodic adjustments are required.

F. LUBRICATION

Internal lubrication is provided by the fluid in the system.

G. REPLACEMENT PARTS

Reliable operation throughout the specified operating range is assured only if genuine Vickers parts are used. Sophisticated design processes and material are used in the manufacture of our parts. Substitutions may result in early failure. Part numbers are shown in the parts drawings listed in Table 2.

H. TROUBLE-SHOOTING

Table 3, lists the common difficulties experienced with relief valves. It also indicates probable causes and remedies for each of the troubles listed.

TROUBLE SHOOTING CHART

TROUBLE	PROBABLE CAUSE	REMEDY
No load pressure or low pressure.	Manual relief improperly adjusted.	Adjust manual relief valve to proper setting.
	Open vent connection.	Plug vent opening.
	Poppet not properly seated.	Back off adjusting screw several turns while running pump to clear any contamination between poppet and seat. Check poppet and seat for wear. Check spring.
	Self cleaning filter is plugged. (located in the pressure port).	Remove, clean and/or replace.
	Control orifice in body is plugged.	Remove filter screen and open orifice with a small wire. (orifice size is 0.040)
	No current to coil.	Check for loose electrical connection. Check output of power supply. Check resistance of coil. (resistance is 17 to 20 Ohms nominal).
	Piston sticking in the open position	Remove piston. Check piston and bore for burrs. Use polishing paper or an Arkansas stone to remove burrs.
Maximum pressure (valve will not modulate).	Plugged flapper orifice.	Clean orifice and clean and/or replace internal filters.
	Secondary filter plugged.	Clean filter.
	Button reversed causing blocking valve to prevent flow to nozzle.	Remove and reverse button.
	Power supply current maximum.	Vary command control of power supply. If current does not change, repair or replace the power supply.
Erratic pressure.	Contamination	Clean the system components, and flush the system.
	Piston sticking in body bore.	Remove piston. Check piston for burrs and freedom of movement in bore. Replace if necessary.
	Erratic input signal from power supply.	Check for loose electrical connections, broken wires, etc.
	Misalignment of cover and body causing piston to stick.	Loosen cover screws and check piston movement as described in reassembly section. Properly torque the cover screws.
Excessive noise or chatter.	High flow through valve.	Check valve flow rating. Replace with larger size valve if necessary.
	Excessive tank line pressure.	Connect tank line directly to reservoir.
	Vent line too long.	Add a restriction (needle valve or orifice), in the vent line next to the valve.
	Manual relief valve setting to close to system pressure.	Set manual relief higher than the maximum pressure setting of the electrically modulated valve.
	Dampening shim left out of the valve. (1000 PSI models only.)	Add shim to valve.
	Dither control located on power supply set to high.	Adjust dither control until a vibration is felt in the machine. Reduce the control setting until vibration just disappears.
	Power supply malfunction.	Check for loose connections, loose ground connection, broken wires, etc. Repair and/or replace.

A. GENERAL

WARNING

Turn off all electrical power and relieve hydraulic pressure. Before breaking a circuit connection, make certain that power is off and system pressure has been released. Lower all vertical cylinders, discharge accumulators, and block any load whose movement could generate pressure.

B. UNIT REMOVAL

1. Remove the unit from the system.
2. Cap all system openings to prevent contamination.

CAUTION

Absolute cleanliness is essential when working on a hydraulic system. Always work in a clean area. The presence of dirt and foreign materials in the system can result in serious damage or inadequate operation.

C. DISASSEMBLY

Periodic maintenance of the valve will generally not require disassembly to the extent described here. However, the sequence can also be used as a guide for partial disassembly. In general, disassembly is accomplished in the item number sequence shown in figure 3. Special procedures are included in the following steps:

NOTE

Discard and replace all "O" rings and gaskets removed during disassembly.

1. Thoroughly clean the exterior of the valve.
2. The valve cover is full of fluid, so hold it over a container when cover (4), figure 3 is removed.

NOTE

Refer to index numbers located on figure 3 throughout the disassembly procedure.

3. Remove parts (1) through (11a) except do not remove adjustment screw (7) from flapper plate S/A (8) unless inspection of nozzle (12) mating surface shows erosion. See figure 3.
4. Remove nozzle (12) with a 5 mm open end or a small adjustable wrench. Turn nozzle counter-clockwise to remove.

NOTE

Do not remove screw (18) or gasket S/A (17) in the following step unless gasket is damaged.

5. Remove parts (13) through (20). Pull coil (19) carefully from body (38), do not break wires. Part (13) does not exist on 3000 PSI models.
6. Remove parts (21) through (30). If spool (27) is tight, thread a 5/16-18, (M8-6H), screw into the spool end, work the spool in and out to loosen, then remove spool from body (38).

CAUTION

Do not clean filter screen (28) with a scribe or a pick.

7. Remove parts (31) through (36). If the check valve seat is tight within the body, a small hooked tool may be used to remove the check valve seat. Press the ball inward and hook the seat; work the seat out by pulling first one side then the other.
8. Remove parts (37) through (52). Do not remove seat (53) unless inspection of piston (50) reveals damage to the piston seating surface.

NOTE

Plunger (46) contains an 8-32 thread for disassembly purposes, (early designs use a 10-24 thread).

9. Remove parts (54) through (66). Use the internal Truarc pliers to remove retaining ring (62).
10. Remove parts (67) and (68). These parts exist on -S6 special models only.

NOTE

Do not remove rollpin (69) in the following step unless damaged. The mounting surface can be scored during removal. If removal is necessary, check surface for burrs and flatness before installation of a new rollpin.

11. Remove parts (69) through (71). Do not remove seat (70) unless piston (59) shows evidence of damage in the seat area.

NOTE

CGE-10-*-20 units use a sleeve (70a) located below seat (70). Refer to figure 3. Replace the seat and sleeve if damaged.

D. CLEANING

All parts must be thoroughly cleaned and kept clean during inspection and assembly. The close tolerance of the valve makes this requirement more stringent than usual. Clean all removed parts, using commercial solvent that is compatible with the system fluid. Compressed air may be used in cleaning the valve, but it must be filtered to remove water and contamination. Clean compressed air is particularly useful in cleaning the spool orifices and body passages.

CAUTION

Do not stone edges of piston (59). See figure 3.

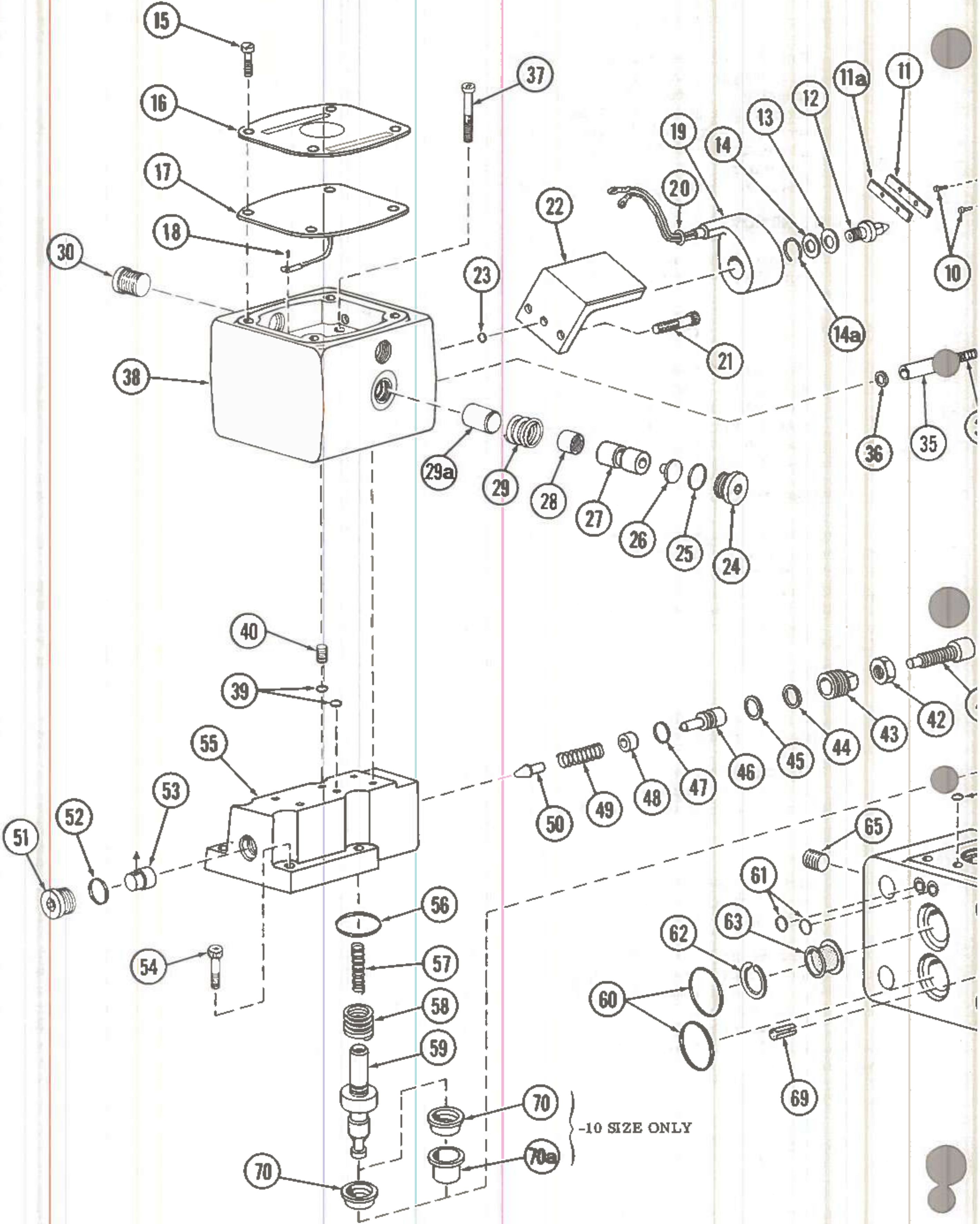
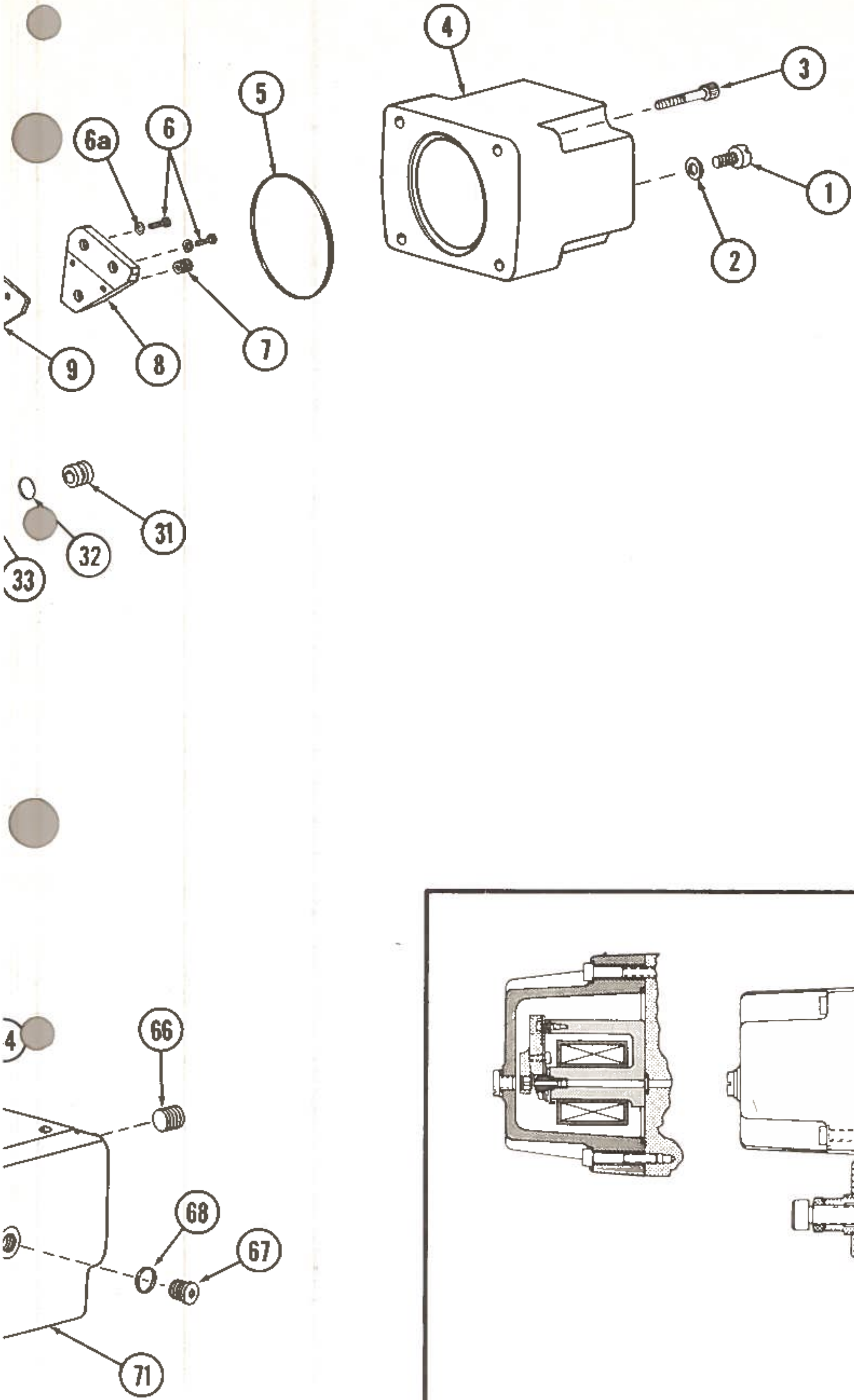
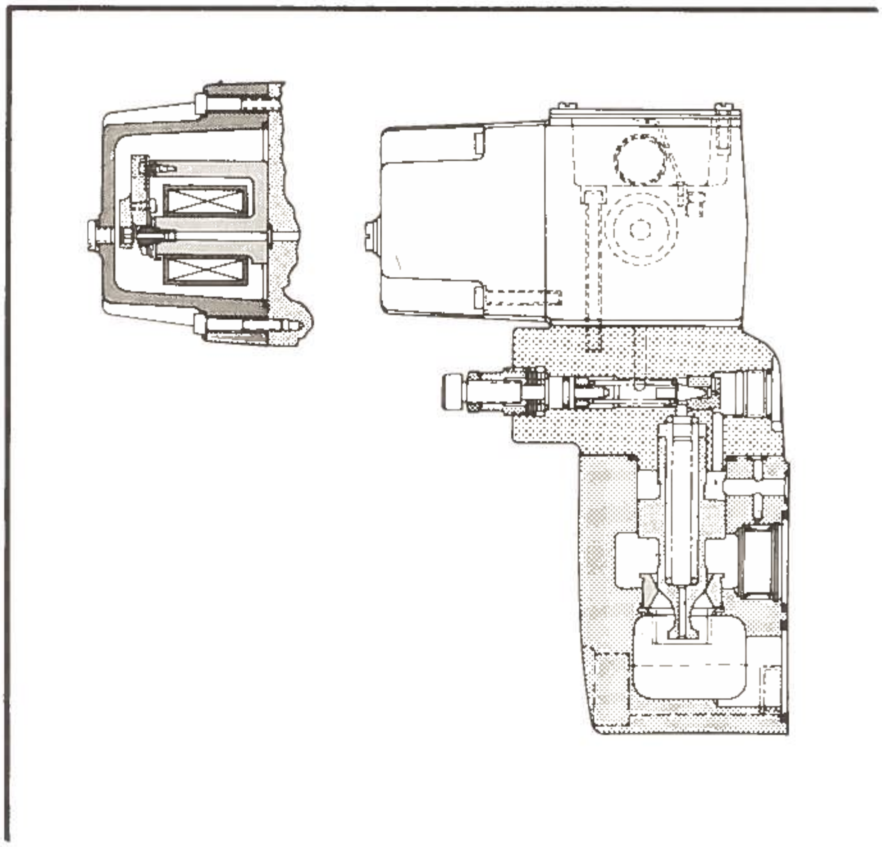


Figure 3. E





ɒded View

FIG. & INDEX NO.	DESCRIPTION	UNITS PER ASSY.
1	SCREW	1
2	WASHER (DYNA SEAL)	1
3	SCREW	4
4	COVER	1
5	"O" RING	1
6	SCREW	2
6a	WASHER	2
7	ADJUSTMENT SCREW	1
8	FLAPPER PLATE S/A	1
9	LEAF SPRING	1
10	SCREW	2
11	SHIMS	A/R
11a	SHIM	1
12	NOZZLE	1
13	DAMPENING SHIM	1
14	COIL RETAINER	1
14a	RETAINING RING	1
15	SCREW	4
16	NAMEPLATE	1
17	WIRE & GASKET S/A	1
18	SCREW	1
19	ENCAPSULATED COIL	1
20	"O" RING	1
21	SCREW	2
22	FRAME	1
23	"O" RING	1
24	PLUG	1
25	"O" RING	1
26	BUTTON	1
27	SPOOL (BLOCKING VALVE)	1
28	FILTER SCREEN	1
29	SPRING	1
29a	ROD	1
30	PLUG	1
31	SEAT	1
32	"O" RING	1
33	BALL	1
34	SPRING	1

FIG. & INDEX NO.	DESCRIPTION	UNITS PER ASSY.
35	RETAINER	1
36	WASHER	1
37	SCREW	4
38	BODY	1
39	"O" RING	2
40	PLUG	1
41	ADJUSTING SCREW	1
42	NUT	1
43	LOCK SCREW	1
44	SHIM	A/R
45	WASHER	1
46	PLUNGER	1
47	"O" RING	1
48	SPACER	1
49	SPRING	1
50	PISTON	1
51	PLUG	1
52	"O" RING	1
53	SEAT	1
54	SCREW	4
55	INTERMEDIATE BODY	1
56	"O" RING	1
57	SPRING	1
58	SPRING	1
59	PISTON	1
60	"O" RING	2
61	"O" RING	2
62	RETAINING RING	1
63	FILTER SCREEN	1
64	"O" RING	1
65	PLUG	1
66	PLUG	1
67	PLUG	1
68	"O" RING	1
69	ROLL PIN	1
70	SEAT	1
70a	SLEEVE	1
71	BODY	1

E. INSPECTION, REPAIR, AND REPLACEMENT

Check that all internal passages are clean and unobstructed. Examine all mating surfaces for nicks and burrs. Minor nicks and burrs. Minor nicks and burrs can be removed with and India stone, or crocus cloth. If unit has operated in a contaminated system, all internal passages of pilot body (38), intermediate body (55) and main stage body (71) must be thoroughly flushed with clean solvent.

NOTE

Refer to index numbers located on figure 3 throughout the inspection, repair and replacement procedure.

1. Inspect all screws for evidence of damaged threads. If threads are damaged, replace the screws.
2. Inspect springs (29, 34, 49, 57 and 58) for damaged coils. Replace springs if coils are damaged. Inspect springs for distortion. The ends of the springs shall be square and parallel to each other. Replace spring if distorted.
3. Perform a continuity test on coil (19). Resistance values should range from 17 to 19 Ohms. This test is superficial, a more rigorous test requires special equipment. Replace the part if threads are damaged. Inspect the orifice face of nozzle for evidence of nicks or scratches. If the orifice size is distorted, or face is eroded, replace the part.
4. Inspect nozzle (12) for damaged threads. Replace the part if threads are damaged. Inspect the orifice face of nozzle for evidence of nicks or scratches. If the orifice size is distorted, or face is eroded. Replace the part.

NOTE

Two nozzle sizes are available:
1. 0.070 inch diameter hole for 1000 PSI models.
2. 0.058 inch diameter hole for 3000 PSI models.

5. Inspect mating surfaces of cover (4), frame (22), body (38), intermediate body (55), and body (71) for nicks and scratches. Remove nicks and scratches using an India stone and/or polishing paper.

NOTE

Use polishing paper on a clean flat surface.

6. If a new piston (59) is required, use a three (3) or four (4) cornered India stone to break the feather edge of balancing grooves. Use 500 grit polishing paper lightly on the outside diameter of the piston. Wash the piston in clean solvent.
7. If seat (70) was removed, make sure hole in body is clear.
8. Inspect spool (27), button (26), and filter screen (28). If spool is scratched across the lands, body (38) may have scratches within the bore. Check to ascertain damage and replace parts if scratches are such that binding of the spool occurs or leakage through the blocking valve is excessive. Minor scratches can be removed with 500 grit paper. Make certain filter screen is not ruptured or bent.

NOTE

If spool (27) shows indications of large particle contamination, replace filter screen (63).

9. Inspect adjustment screw (7) for erosion. If adjustment screw (7) is loose within flapper plate, replace screw. Inspect threads; screws (10) should thread easily into the flapper plate.
10. Inspect leaf spring (9) for burrs and possible fracture. Leaf spring should be flat. If a small bow exists, install the leaf spring against flapper plate (8) with bow outward. Screws (10) will pull the leaf spring flat against the flapper plate S/A. If bow is too great to be corrected, replace leaf spring (9).
11. Inspect the check valve assembly for burrs, and possible fracture.
12. Inspect piston (59) to body (71) clearance as follows: Clean and lubricate piston and body. Insert piston into body bore and turn 360° while moving the piston in and out of the bore. If binding occurs, remove piston, stone the balancing grooves and use 500 grit paper lightly on the surface of the piston. Clean and lubricate piston (59) and perform the clearance test again. Piston (59)should fit the bore with no noticeable side play. Check the piston's fit into intermediate body (55). Use the same procedure.
13. Make sure the 0.040 control orifice located in body (71) is open. The orifice is located below "O" ring (64) and is a straight through drilled hole.

F. ASSEMBLY

Replace the "O" rings removed from the unit with those supplied in the seal kit. Lubricated "O" rings and parts, using clean system fluid to facilitate assembly. Assembly of the parts will be in the reverse numerical sequence. Special procedures are included in the following steps:

NOTE

Refer to index numbers located on figure 3 throughout the assembly procedure.

1. If seat (70), (70 and 70a on -10 size units), was removed from body (71), install a new seat by pressing fully into place against the shoulder. Use an arbor press for this operation.
2. If seat (53) was removed, install new seat (53) full in against the shoulder. Orient radial hole toward pilot stage see figure 3. Use an arbor press to install seat (53).
3. If rollpin (69) was removed, make sure the mounting surface is flat before installation of a new rollpin.
4. Install plugs (67, 66, and 65) into body (71). Plug (67) exists on the -S6 models only. Use new "O" ring (68) on plug (67).
5. Install "O" ring (64), filter screen (63) and retaining ring (62) into body (71).
6. Install parts (59) through (54). Torque screws (54) hand tight, then use a hex key to move piston (59) within the valve (see figure 4). Piston (59) should not stick or show evidence of bind. Cross torque screws (54) to 112 lbf. in., (12.6 N.m) maximum. Check the piston again to see if a bind occurs.

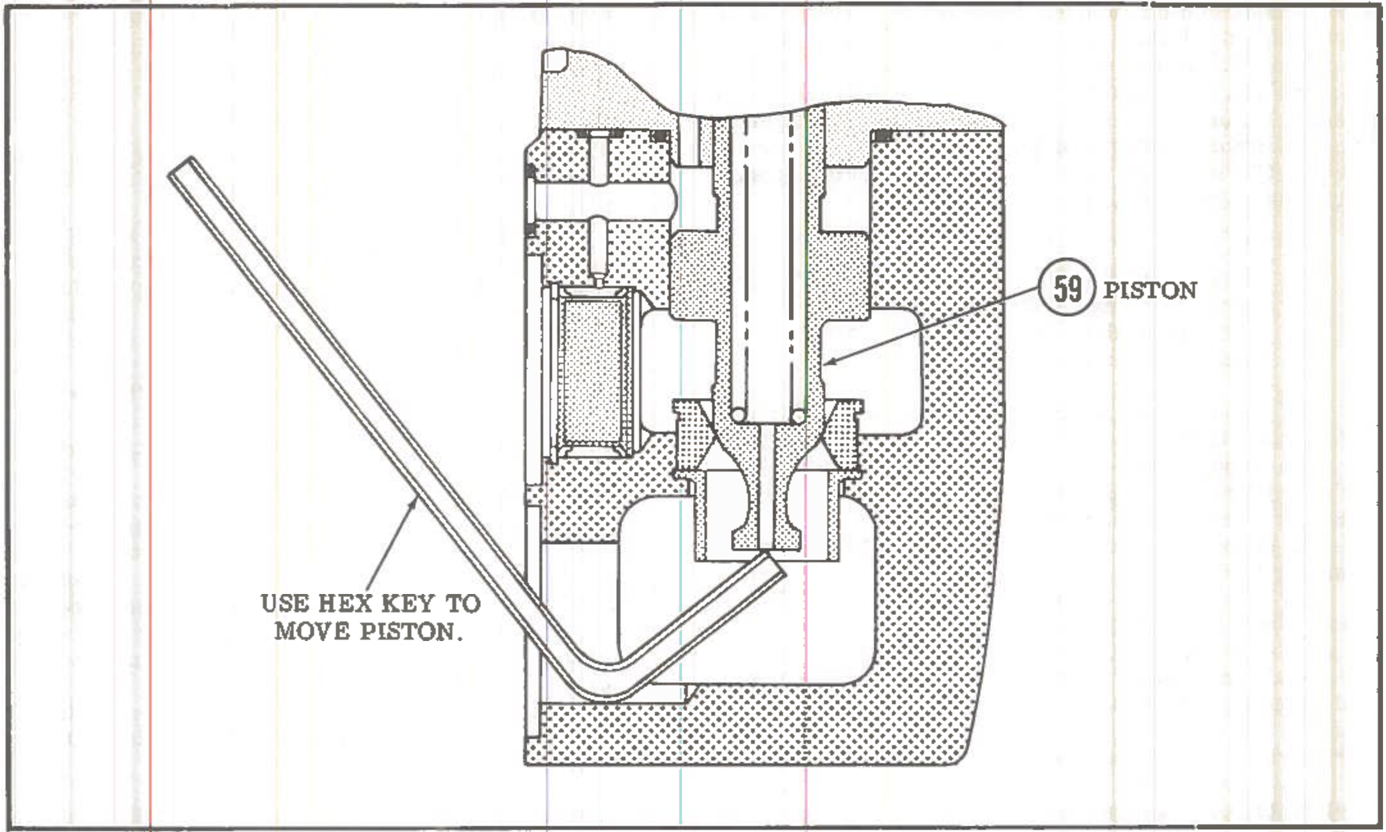


Figure 4. Check of main piston for bind.

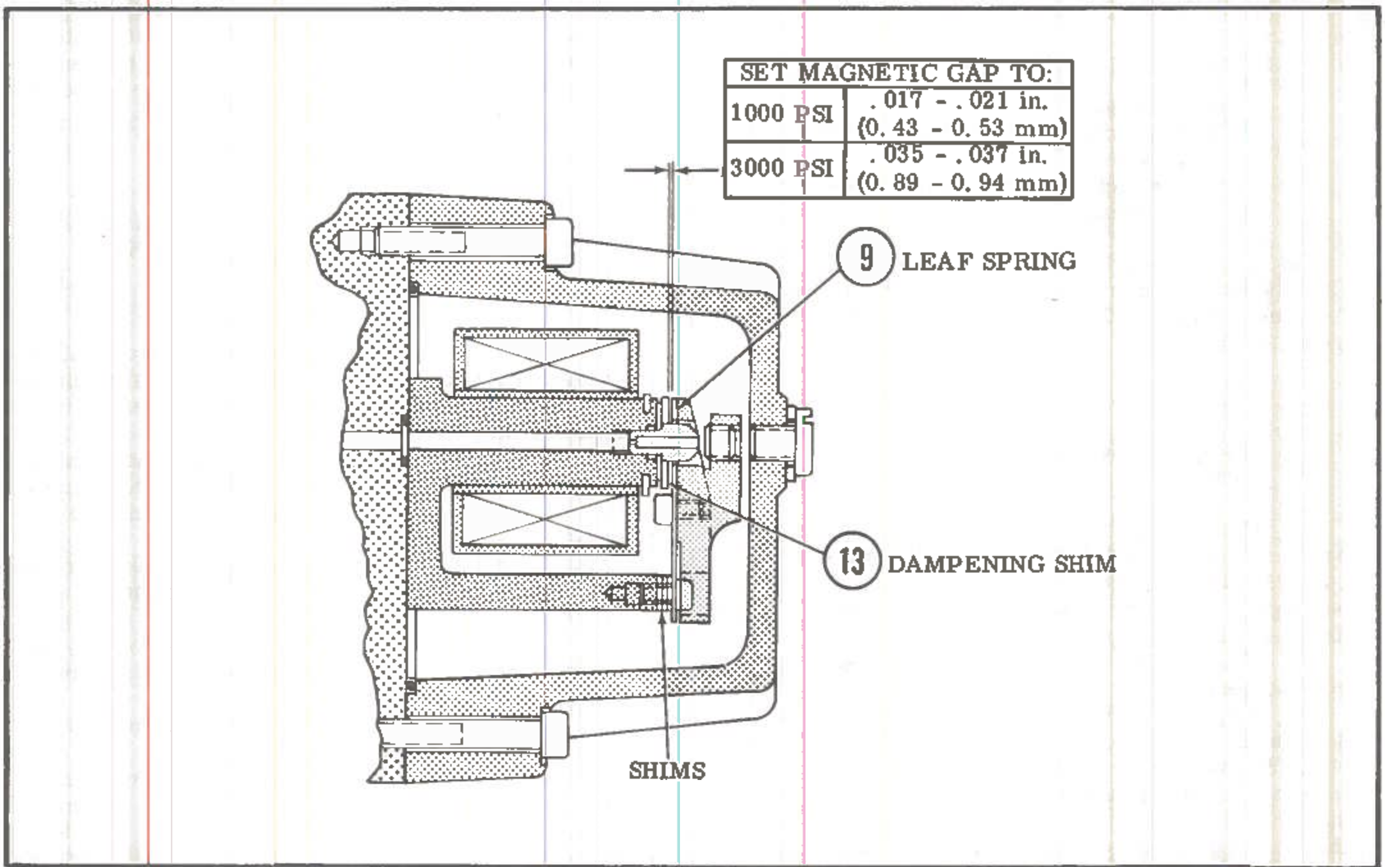


Figure 5. Setting magnetic gap on 1000 & 3000 PSI models.

Litho in U.S.A.

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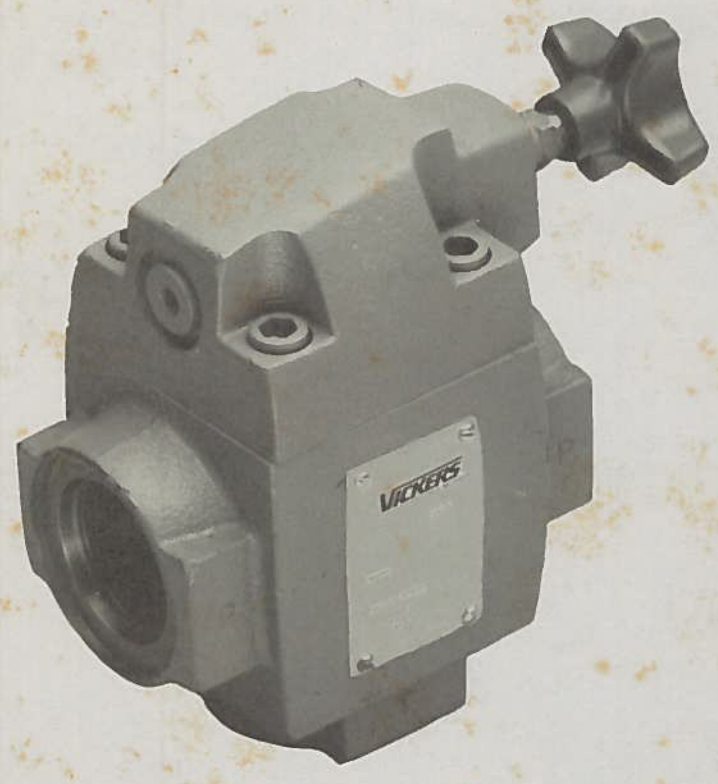
VICKERS®
A TRINOVA COMPANY

Overhaul Manual

Balanced Piston Relief Valves

CG/CS/CS5-03/06/10 Series
CT/CT5/CG5-06/10 Series



Vickers, Incorporated
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REVISED 1-1-85

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Section III - PRINCIPLES OF OPERATION

A. PRESSURE RELIEF

Figure 1 illustrates the basic valve operation. The valve pressure setting is determined by the adjusting screw position which varies the heavy spring compression. The balanced piston is normally held against the seat by the light spring. System pressure is present in chamber A and is connected to chamber B through orifice C.

The closed position of the valve is shown in Figure 1A. With system pressure less than the valve setting, the pilot poppet is held against its seat by spring force. Pressures in chambers A and B equalize through orifice C. Thus, the piston is hydraulically in balance and held against its seat by the light spring.

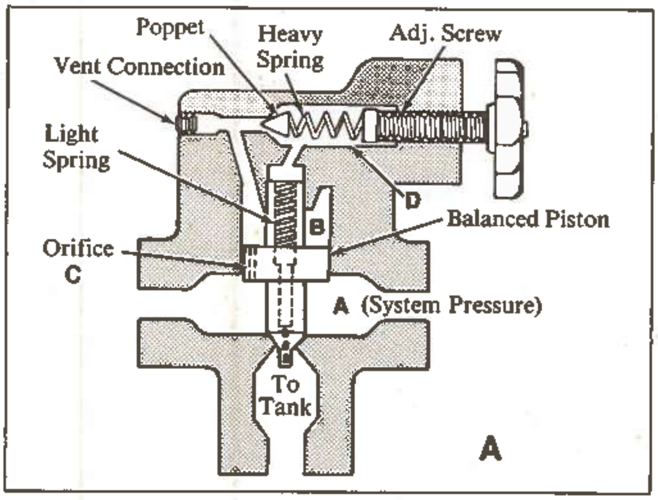


Figure 1A.

In Figure 1B the valve is shown throttling fluid to the tank port. This occurs when system pressure exceeds the heavy spring setting and forces the poppet away from its seat.

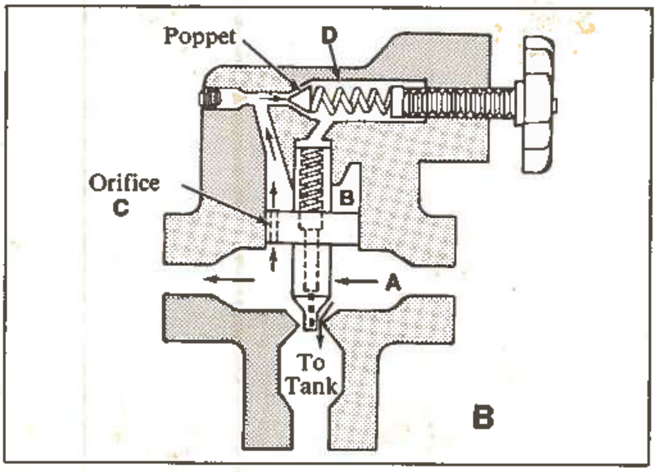


Figure 1B.

Fluid then flows through orifice C and chamber B, past the poppet into chamber D, and down through the drain hole in the center of the piston to the tank port.

The pressure in chamber B is limited by the setting of the heavy spring. When pressure in chamber A exceeds chamber B sufficiently, pressure unbalance overcomes the force of the light spring and lifts the piston. Excess fluid then flows past the bottom of the piston to tank.

When system pressure drops below the valve setting, the poppet reseats. Control flow through orifice C stops and pressures in chambers A and B are again effectively equalized.

The light spring then forces the piston toward the seat while orifice C continues to equalize pressure between chambers A and B. When the balance piston is closed against its seat, all flow through orifice C stops.

B. VENTING

The "High-Vent" option ("V" in the model code) is used when it is necessary to maintain pilot pressure for other valves in the system. This option provides a faster valve de-venting (closing) action. Higher pressure (approximately 80 PSIG) is maintained when the valve is vented because a heavier piston spring is used.

Relief valves can be vented to unload pump delivery to tank in the following manner:

Connect a shut-off valve to the vent port of the main relief valve. Chamber 'B' above the balanced piston can be opened to tank (see Figure 1B). This removes pressure at the top of the balanced piston. Pressure in chamber 'A' overcomes the light spring, unseats the balanced piston, and diverts all pump delivery to tank.

A solenoid controlled directional valve (C*5) may be used to vent flow to tank. This directional valve is mounted on top of a standard relief valve to form a single package. See Figure 6.

C. REMOTE CONTROL

The main relief valve may be adjusted from a remote location by using another adjustable valve similar in function to the main relief valve pilot stage (see Figure 2). Flow past the poppet of the remote control valve is directed to tank. The following rules should be maintained for optimum results:

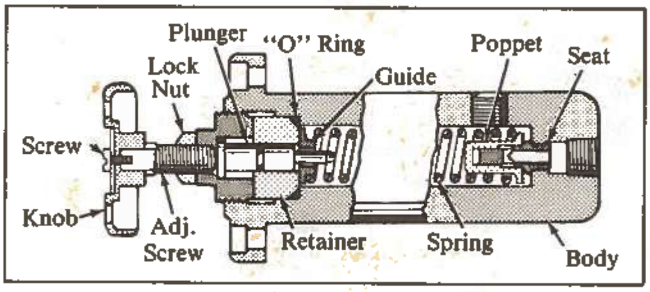


Figure 2.

1. Keep hydraulic lines (tubing) as short as possible.

2. Set main relief valve 200-300 PSIG above maximum operating pressure. DO NOT exceed the valve pressure rating.

3. Set remote control valve to maximum operating pressure.

4. Check system for stability characteristics. If the system is unstable, reduce the line length and/or proceed to step 5.

5. Install an orifice in the vent opening of the main relief valve cover and in the pressure port of the remote control valve. DO NOT go below 0.040 inch diameter or a malfunction could result. Orifices should be as large as possible to prevent excessive pressure drop and still maintain noise free operation.

Section IV - INSTALLATION

A. INSTALLATION DRAWINGS

The installation drawings listed in Table 2 show installation dimensions, port locations and operating parameters. Manifold, subplate and bolt kit information is also included.

NOTE

The tank line must be piped directly to tank to minimize back pressure. The drain line from the remotely operated valve (vent valve) must also be directly piped to tank. Any pressure in the drain line is additive to the pressure setting of the valve.

B. CIRCUIT CONNECTION.

Threaded type CT/CS valves are usually connected directly in the pressure line. Circuit flow passes through the ports located on opposite sides of the valve body. The bottom port (opposite the cover) is the return flow port and is connected to tank. These valves may be teed into the pressure line by plugging or blocking one of the pressure outlet ports.

CG type gasket mounted valves are teed into pressure lines. The tee is connected to the pressure port of the valve sub-plate or manifold. The return port is connected to tank. The valve must be mounted against a flat, ported, mounting surface. Repair or replacement of CG valves is simplified in that piping need not be disturbed.

C. PIPING AND TUBING

1. All pipes and tubing must be thoroughly cleaned before installation. Recommended cleaning methods are sandblasting, wire brushing and pickling. Refer to instruction sheet 1221-S for pickling instructions.

2. To minimize flow resistance and the possibility of external leakage, use only the necessary fittings and connections required for proper installation.

3. The number of bends in tubing should be kept to a minimum to prevent excessive turbulence and friction of fluid flow. Tubing must not be bent too sharply. The recommended radius for tube bends is three times the inside diameter.

D. FLUIDS AND SEALS

Standard seals (Nitrile) can be used with petroleum, water glycols, and water-oil emulsion type fluids.

F3 seals (Viton*) can be used with all commonly used industrial hydraulic fluids. Viton* is compatible with petroleum, water-base and synthetic fire-resistant fluids.

*Trademark of Dupont De Nemours Co., Inc.

Section V - INSPECTION & MAINTENANCE

A. INSPECTION

Periodic inspection of the fluid condition and tube or piping connections can save time consuming breakdowns and unnecessary parts replacement. The following should be checked regularly.

1. All hydraulic connections must be kept tight. A loose connection in a pressure line will permit the fluid to leak out. If the fluid level becomes so low as to uncover the inlet pipe opening in the reservoir, extensive damage to the system can result. Loose connections also permit air to be drawn into the system resulting in noisy and/or erratic operation.

2. Air bubbles in the reservoir can ruin the valve and other components. If bubbles are seen, locate the source of air and seal the leak.

B. CLEANLINESS

Clean fluid is the best insurance for long service life. Therefore, check the reservoir periodically for dirt and other contaminants. If the fluid becomes contaminated, flush the entire system and add new fluid.

To insure your hydraulic system is clean, perform the following steps:

1. Clean (flush) the entire system to remove paint, metal chips, welding shot, etc.

2. Filter each oil change to prevent introduction of contaminants.

3. Provide continuous oil filtration to remove sludge, products of wear and corrosion generated during the life of the system.

4. Provide protection to all areas that can introduce airborne contaminants into the system.

5. Perform regular servicing procedures of filters, breathers, and reservoirs.

C. ADDING FLUID TO THE SYSTEM

When hydraulic fluid is added to replenish the system, pour it through a fine wire screen (200 mesh or finer). DO NOT use a cloth to strain the fluid because lint may enter the system. When applicable, pump the fluid through a 10 micron filter or use a PFTU (porta filter and transfer unit). For PFTU information, order bulletin 366.

D. HYDRAULIC FLUID RECOMMENDATIONS

Hydraulic fluid within the system performs the dual function of lubrication and transmission of power. To insure proper lubrication, system life, and component reliability, fluid selection should be made carefully with the assistance of a reputable supplier. Fluid selection should be acceptable for use with all valves, motors and pumps within the system. Data sheets for fluid selection are available from Vickers, Inc., 1401 Crooks Road, Troy MI 48084, Attn. Technical Publications. For Industrial applications, order data sheet I-286-S.

The fluid recommendations noted in the data sheet are based on our experience in industry as a hydraulic component supplier. Where special considerations indicate a need to depart from these recommendations, see your Vickers sales representative.

Section I · INTRODUCTION

A. PURPOSE OF MANUAL

This manual describes operational characteristics, maintenance requirements, and overhaul information for Vickers balance piston relief valves. Information contained herein pertains to the latest design models that are listed in Table 1.

MODEL
CT/CS-10-**-30
CT/CS/CG-H10-**-30
CT/CS/CG-06-**-50
CT/CS/CG-H06-**-50
CS-03-**-50
CS5-03-***-***-90
CT5/CG5-*06/*10-***-***-90

Table 1

B. RELATED PUBLICATIONS

Service parts and installation dimensions are not contained in this manual. The parts and installation drawings listed in Table 2 are available from any Vickers sales engineering office or from:

Vickers, Incorporated
Technical Publications
1401 Crooks Road
Troy, Michigan 48084

MODEL DESCRIPTION	PARTS & SERVICE DRAWING	INSTALLATION DRAWING
CG-06-**-20	I-3302-S	510900
CG-06-**-40	I-3306-S	510900
CG-06-**-50	I-3368-S	510900
CG-H06-*V-50	I-3366-S	510900
CG-H10-*V-30	I-3399-S	510900
CG-10-**-20	I-3301-S	510900
CG-10-**-30	I-3697-S	510900
CS-03-**-20	I-3301-S	510500
CS-03-**-40	I-3305-S	510500
CS-03-**-50	I-3369-S	510500
CS-06-**-20	I-3304-S	510500
CS-H06-*V-50	I-3367-S	510500
CS-H10-*V-30	I-3699-S	510500
CS-10-**-20	I-3304-S	510500
CS-10-**-30	I-3698-S	510500
CT-06-**-20	I-3301-S	510500
CT-06-**-40	I-3305-S	510500
CT-06-**-50	I-3369-S	510500
CT-H06-*V-50	I-3367-S	510500
CT-H10-*V-30	I-3699-S	510500
CT-10-**-20	I-3301-S	510500
CT-10-**-30	I-3698-S	510500
CS5-*03-***-***-70 *-***-70	I-3364-S	511005
CS5-*03-***-***-80 *-***-80	I-3679-S	511005
CS5-*03-***-***-81 *-***-81	I-3691-S	511005
CS5-*03-***-***-90 *-***-90		511006
CG5/CS5/CT5-*06-***-***-70	I-3364-S	511005
CG5/CS5/CT5-*06-***-***-80	I-3679-S	511005
CG5/CS5/CT5-*06-***-***-81	I-3691-S	511005
CG5/CS5/CT5-*10-***-***-70	I-3365-S	511005
CG5/CS5/CT5-*10-***-***-80/81	I-3680-S	511005
CG5/CS5/CT5-*10-***-***-90		511006

Table 2. Related Publications

C. MODEL CODES

Variations within each model series are covered in the model code. See Table 3. Each unit has a model code stamped into the nameplate. Service inquiries should always include the complete model number as noted on the nameplate.

MODEL CODE BREAKDOWN

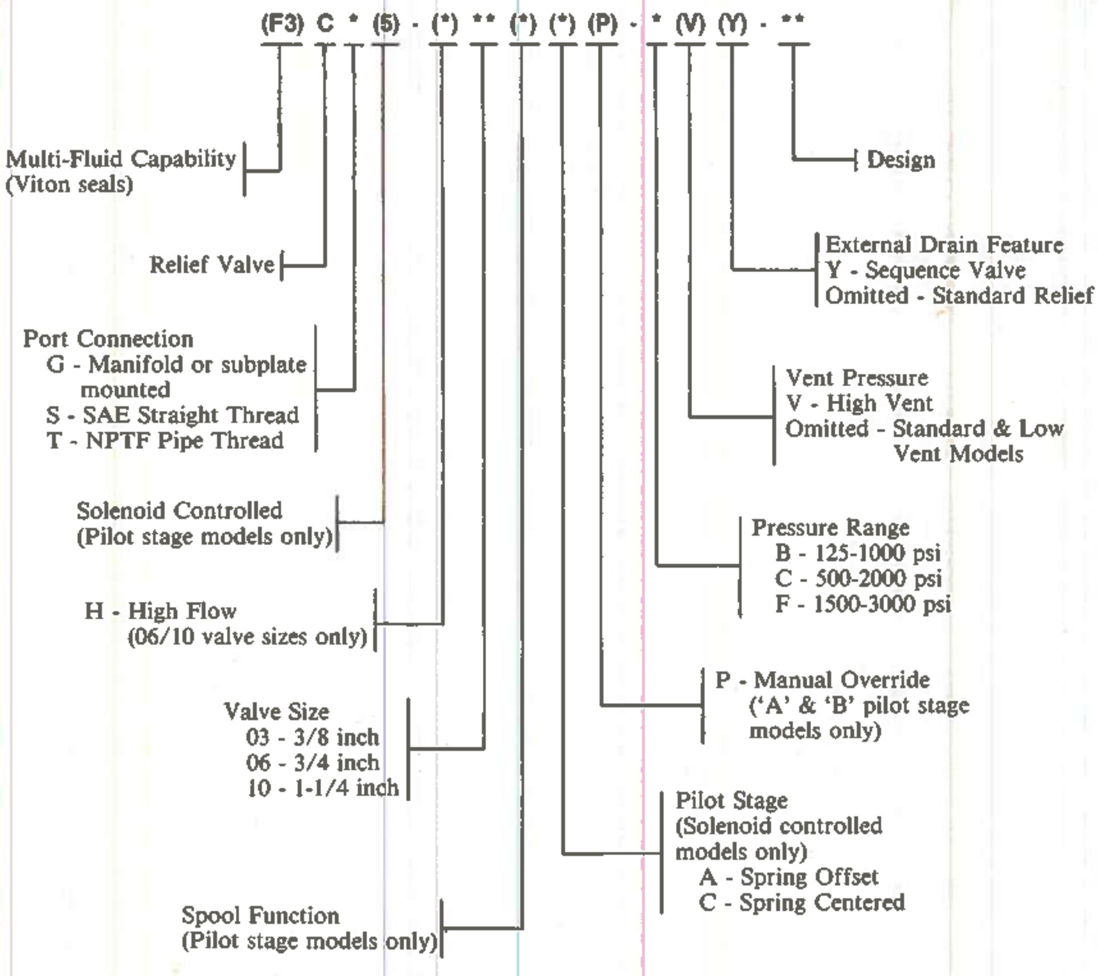


Table 3. Model Code

Section II - DESCRIPTION

A. GENERAL

Relief valves are devices used to limit maximum pressure in hydraulic systems. When system pressure starts to exceed the pressure setting of the relief valve, a controlled amount of hydraulic fluid bypasses through the tank port and limits the system pressure to the valve setting. A fine incremented adjustment assures precise regulation over wide pressure ranges.

A Vickers relief valve provides a fast response with very low pressure override characteristics because of its two-stage balance piston design. The balance piston relief valve is so named because in normal operation it is in hydraulic balance. Further details are discussed in Section III.

B. BASIC PARTS

Relief valves consist of two sections: the cover section and the body section. The cover section includes a pressure adjustment screw, a heavy spring, a poppet, a seat, and a vent connection. The body section includes a piston, a light spring, a seat, and the port connections.

NOTE
Reliable operation throughout the specified operating range is assured only if genuine Vickers parts are used. Sophisticated design processes and materials are used in the manufacture of our parts. Substitutions may result in early failure.

NOTE
Replace all parts that do not meet the following specifications.

1. Inspect all screws (13) for evidence of damaged threads. If threads are damaged, replace the screws.

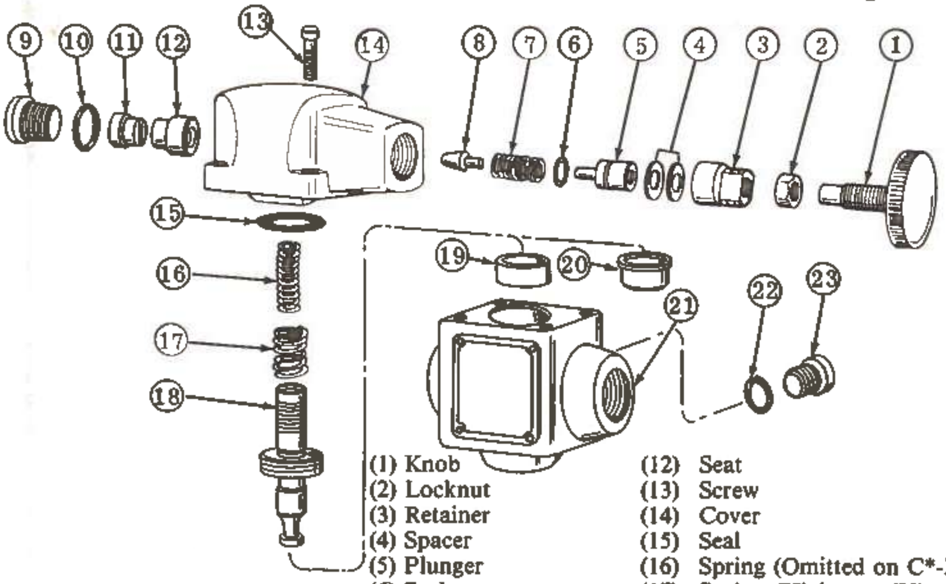
2. Inspect springs (7), (16), and (17) for distortion or damaged coils. Replace springs if coils are damaged.

3. Inspect the piston (18) to cover (14) clearance. Insert the piston into the cover and check for looseness. A close tolerance fit is mandatory for proper valve operation. If a loose fit is noted, the cover is worn and must be replaced.

4. Inspect the piston (18) to body (21) clearance. The piston should have a close tolerance fit as noted in step 3. If the piston is loose inside the body bore, replace the body and seat (19).

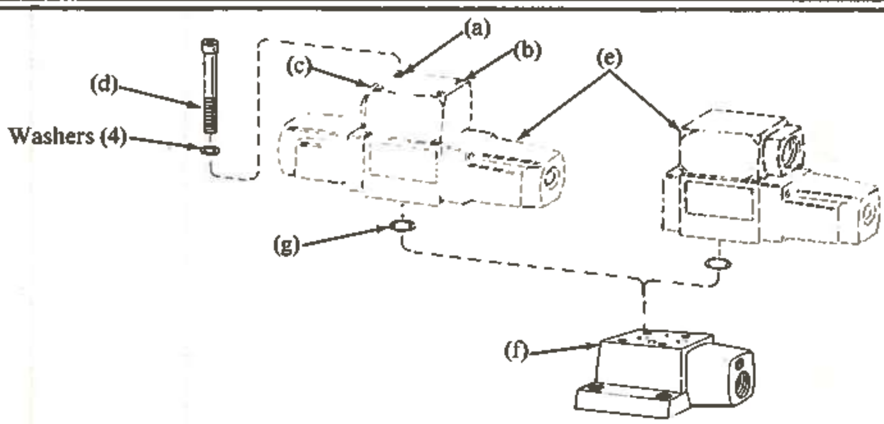
5. Inspect piston (18) for nicks or scratches across the sealing surface. Make sure the balance hole in the piston is free from foreign material. Remove minor scratches on piston with 500 grit polishing paper. If the piston has heavy scratches, replace the piston (18), seat (19), and body (21).

6. Inspect poppet (8) and seat (12) for heavy wear or evidence of washout. Replace both the poppet and seat if heavy wear or washout is noted.



(1) Knob
(2) Locknut
(3) Retainer
(4) Spacer
(5) Plunger
(6) Seal
(7) Spring
(8) Poppet
(9) Plug
(10) Seal
(11) Restriction Plug (10 size only)
(12) Seat
(13) Screw
(14) Cover
(15) Seal
(16) Spring (Omitted on C*-H06-**-50 model)
(17) Spring (High-vent 'V' models)
(18) Piston
(19) Seat
(20) Sleeve (High-flow 'H' models)
(21) Body
(22) Plug
(23) Seal

Figure 5. -50 Design Relief Valves



(a) Screw (4)
(b) Name Plate
(c) Directional Valve Cover
(d) Screw (4)
(e) Directional Valve
(f) Relief Valve Cover
(g) Seals (4)

Figure 6. C*5 Solenoid Controlled Relief Valve

7. If seat (19) was removed during disassembly, make sure inside of body (21) is clean and free from damage.

8. Inspect mounting surfaces on cover and body for burrs, nicks, or scratches. Remove burrs and/or scratches with India stone or polishing paper. Also check body and cover for damaged or worn threads. If threads are worn or damaged, replace the part.

F. ASSEMBLY

Assembly of parts will be in reverse numerical sequence as shown in Figure 5. Obtain new seals. Seal kits are noted on the parts and service drawings that are tabulated in Section I, B. Make sure all parts are clean prior to assembly. Lubricate all parts with a light film of clean hydraulic fluid.

1. Secure body (21) in a vise.

2. If sleeve (20) was removed during disassembly, insert the sleeve into bottom of body bore. NOTE: This step applies to C*-H**-30/50 models only.

3. If seat (19) was removed, install new seat into body (21) as follows:

a. Lubricate seat with petroleum jelly or grease that is compatible with system fluid.

b. Position the seat square over the body bore. Place a rod against the seat. Hold the rod centered. Tap on end of rod with hammer until seat is started into body, then drive the seat into the body bore until it bottoms out. Inspect the body and seat to be sure no chips or metal shavings were developed.

4. Install parts (18) through (15). NOTE: Spring (16) is used on high vent models only ('V' in the model code).

5. Slide piston (18) back and forth within the body bore. Also rotate the piston 360° to make sure piston movement is free and without bind.

6. Assemble cover (14) to body (21). Cross tighten four screws (13) evenly. Torque the screws to 14.9-20.3 Nm. (133-178 lb.in.).

7. Secure valve body in vise to a horizontal position. Place screwdriver or similar tool in tank port against bottom of piston (18). Push the piston up and down within the body. If the piston hangs up or binds, loosen screws (13) on cover (14) to a snug condition. Lightly tap around cover perimeter with a soft tip hammer until the piston moves freely within the body bore. Retighten the cover screws.

8. Install parts (11) through (9). NOTE: Restriction plug (11) exists in C*-10-** models only. Torque plug (9) to 22.6-27.1 Nm. (200-240 lb.in.).

9. Install parts (8) through (3). Be sure to install the same quantity of spacers (4) that were removed. The spacers determine the pressure adjustment range of the valve. Make sure seal (6) is assembled on plunger (5).

10. Install parts (2) and (1). Thread knob (1) in retainer (3) approximately five complete turns.

NOTE
The following step applies to C*5 solenoid operated relief valves only.

11. Assemble directional valve on cover in reverse alphabetical sequence as shown in Figure 6. Torque screws (d) to 5.6 Nm. maximum (50 lb.in.).

Section VII - START-UP AND TEST

A. START-UP

Start the system and sequence the unit through all positions while watching for appropriate movement of actuators. Improper or erratic movement of the actuators may indicate incorrect assembly of the unit or presence of trapped air.

B. TEST

A test stand having regulated flow, temperature control and special fixtures is required to fully test the performance of the rebuilt unit. Because of this, only the functional test shown in the start-up paragraph is given. If such a test stand is available, test the unit to the requirements set forth in the installation drawings.

E. OVERLOAD PROTECTION

A relief valve must be installed in the system as close to the pump as possible. The relief valve limits pressure in the system to a prescribed maximum. The setting of the relief valve depends on the work requirements of the system.

F. PRODUCT LIFE

The longevity of these products is dependent upon environment, duty cycle, operating parameters and system cleanliness. Since these parameters vary from application to application, the ultimate user must determine and establish the periodic maintenance required to maximize life and detect potential component failure.

G. TROUBLESHOOTING CHART

Table 4 lists the common difficulties experienced with pumps and hydraulic systems. It indicates probable causes and remedies for each of the troubles listed.

TROUBLE	PROBABLE CAUSE	REMEDY
ERRATIC PRESSURE	Foreign matter in system	Drain, flush and refil system with clean fluid.
	Worn poppet or seat in cover	Replace poppet and seat.
	Piston sticking in body or cover	Clean piston. Remove burrs by light lapping. Check freedom of movement on reassembly. Replace if necessary.
LOW PRESSURE OR NO PRESSURE	Valve improperly adjusted	Adjust valve to proper setting.
	Vent connection open	Plug vent connection.
	Balance hole in piston plugged	Remove piston and clean out. If necessary, drain system and refill with clean fluid.
	Poppet in cover not seating	Back off adjusting screw several turns while running pump to be certain foreign matter is not caught on the seat. Check condition of seat, spring, and poppet if malfunction persists.
EXCESSIVE NOISE OR CHATTER	High oil velocity through valve	Check valve flow rating. Replace with larger valve if necessary.
	Distorted control spring	Replace spring.
	Worn poppet or seat in cover	Replace poppet and seat.
	Excessive tank line pressure	Connect return port directly to tank.
	Vent line too long	Place a restriction, eg. needle valve or orifice plug in vent line next to relief valve.
	Valve setting too close to that of system operating pressure	Set relief valve at least 150 PSI higher than other valves in circuit.

Table 4. Troubleshooting Chart

Section VI - OVERHAUL

A. UNIT REMOVAL

WARNING
Turn off all electrical power and relieve any hydraulic pressure. Block any load that could generate pressure.

1. Remove relief valve from system.

2. Drain appropriate hydraulic lines and remove the valve from system.

3. Cap all system openings to prevent contamination.

4. Place the relief valve on a clean work bench.

B. SERVICE TOOLS

The following tools are recommended to overhaul a CG, CS, CT, or C*5 relief valve.

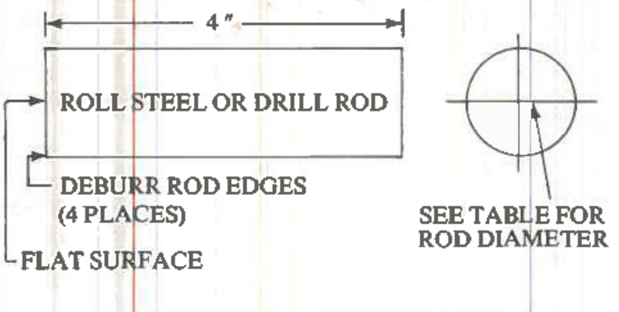
STANDARD TOOLS AND EQUIPMENT:

1. A 6 inch crescent wrench.
2. One set of hex key wrenches with a socket adaptor.
3. Petroleum jelly or grease that is compatible with hydraulic fluids.
4. Cleaning solvent.
5. A small ball peen hammer.
6. One medium size screwdriver.
7. One torque wrench (0-250 lb.in.)
8. A clean work bench that is equipped with a vise.
9. Shop air (90 psi).

SPECIAL TOOLS

Depending on the extent of repair, the following special tools are recommended.

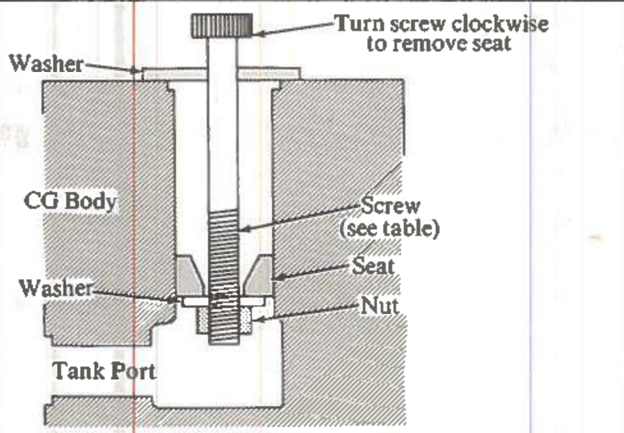
1. A piece of drill rod or roll steel to remove the seat within the valve body. See Figure 3.



MODEL	ROD DIAMETER
CS-03	3/4 inch (19.05 mm)
CT/CS-(H)06	3/4 inch (19.05 mm)
CT/CS-(H)10	1 inch (25.4 mm)

Figure 3. Disassembly Tool to Remove Seat (19) from Body (21)

2. One screw (approximately 4 inches long), two washers, and one nut. This particular tool is needed to remove the seat and/or sleeve from the body of CG (subplate mounted) models only. See Figure 4.



MODEL	SCREW DIA.	SCREW LENGTH
CG-03/06	3/8 inch (9.52 mm)	4 inch (101.6 mm)
CG-10	5/8 inch (15.87 mm)	4 inch (101.6 mm)

Figure 4. Seat (19) Removal Tool (CG Models)

C. DISASSEMBLY

Periodic maintenance of the relief valve will generally not require disassembly to the extent described here. However, the following disassembly sequence can be used as a guide for partial disassembly. In general, disassembly is accomplished by item number sequence shown in Figure 5.

1. Thoroughly clean the valve exterior with cleaning solvent.

2. Secure valve body (21) in a vise.

3. Loosen lock nut (2).

4. Turn knob (1) counterclockwise and remove knob from valve cover (14). (Note: An adjusting screw replaces the knob on C*5 models.)

5. Remove parts (3) through (8). Inspect poppet (8) for damage to sealing surface. If poppet (8) is damaged, replace with a new cover subassembly.

6. Inspect seat (12) for nicks, scratches, and washout. If the seat shows evidence of damage, replace with a new cover subassembly. DO NOT attempt to remove seat (12) from cover (14).

7. If seat (12) is in good condition, remove plug (9), seal (10), and spacer (11). (NOTE: Spacer (11) exists on C*-10-**-** models only.)

8. Remove four screws (13) from cover (14), then disassemble the cover from body (21).

9. Remove parts (15) through (18) from body (21). Inspect piston (18) sealing surface for heavy scratches and other damage. Discard seal (15).

10. If piston (18) is damaged, turn valve body (21) in vise so tank port faces up. Insert a rod (reference Figure 3) into the tank port against seat (19). Tap on rod end with hammer and remove the seat (19) from body (21). For C*-H**-30/50 models, insert rod against sleeve (20) and remove sleeve and seat at the same time.

NOTE
The following step refers to CG models only.

11. If piston (18) is damaged, secure body (21) in vise so mounting surface is face up. Insert a screw through seat (19). See Section VI, B and Figure 4 for removal of seat (19).

12. Remove plug (22) from body (21). Remove seal (23) from plug (22).

13. Discard seals (6), (10), (15) and (23).

D. DISASSEMBLY (C*5 MODELS)

Except for removal of the solenoid operated directional valve, the disassembly sequence of a C*5 valve is essentially the same as a standard relief valve.

1. Remove the four nameplate screws (a) and loosen nameplate (b) from directional valve cover (c).

2. Loosen four screws (d) and remove directional valve (e) from valve cover (f).

3. Discard seals (g).

4. Disassemble the relief valve per Section VI, C and follow Figure 5.

NOTE
This manual does not cover the repair and/or overhaul of solenoid operated directional valves. If the directional valve causes the relief valve to become inoperative, obtain the necessary parts and service information for directional valves.

E. INSPECTION, REPAIR AND REPLACEMENT

NOTE
All parts must be thoroughly cleaned and kept clean during inspection and assembly). The close tolerance of the parts makes this requirement very important.

1. Discard all old seals. Wash all parts in a clean mineral oil solvent and place them on a clean surface for inspection.

2. Carefully remove burrs by light stoning or lapping. Be certain there is no paint or burrs on matting surfaces of valve bodies.

3. Inspect the valve spools and bores for burrs and scoring. If scoring is not deep enough to cause objectionable leakage, the surfaces can be stoned or polished with crocus cloth. If scoring is excessive, the valve body and spool must be replaced by ordering a new section. Check the valve spool for freedom of movement in the bore.

4. Check the relief valve for smooth movement in its bore. The valve should move from its own weight.

D. ASSEMBLY

NOTE

Coat all parts with clean hydraulic oil to facilitate reassembly and provide initial lubrication. Petroleum jelly can be used to hold seal rings in place on assembly.

1. Valve Body (Figure 9) - On models with single-acting spool, install the "O" ring on the port plug and plug the appropriate cylinder port. Tighten the plug securely, but DO NOT over tighten.

2. Relief Valve - Install the "O" ring on the relief valve plug. Place the relief valve assembly in its bore, hex nut end towards opening. Install the spring and plug and tighten the plug securely but DO NOT over tighten.

3. Check Valve - Install a new back-up ring and "O" ring on the check valve plug with the "O" ring toward the spring and poppet. Place the poppet and spring in the body and install the plug.

4. Operating Spool - If centering spring and spool have been removed, install new "O" rings in the "O" ring groove in the body at each end of the spool bore. Install spool in bore from the cap end. Install the flat retainer, guide and screw. Tighten the screw securely. Align the flat retainer by shifting the spool. Spool bind is an indication of flat retainer misalignment. Install the end cap and attaching screws. Tighten the end cap screws securely. On models with detents grease all the detent parts and install the piston, spring and plug. Be sure to screw the plug in all the way.

5. Assembly of Unit Sections.

CAUTION

Make sure all mating surfaces of valve bodies are free of burrs and paint.

Install seal rings in the grooves in the body of each inlet and center section. Use petroleum jelly to hold the seals in place. For CM2 valves, install the spacers to insure against spool bind when the studs are tightened. With the mounting feet on a flat surface carefully place the sections together in the same order in which they were removed. The mounting feet must be maintained in a flat plane to prevent spool bind (due to body distortion) when the valve is mounted for operation. If levers are used, install pins in each spool and assembly the levers, fulcrum rod and "E" rings. Tighten the nuts on the CM2 to 45-50 foot pounds torque and on the CM3 to 55-60 foot pounds torque.

SECTION VII-VALVE OPTIONS

A. GENERAL - Operating sections can be supplied with anti-cavitation check valves, and combination anti-cavitation check valves with cylinder port relief valves. The use of these accessories will be identified by a special feature suffix on the model number. Refer to the installation drawings listed in Table 1 for these options.

1. Anti-Cavitation Check Valve - To eliminate cavitation created in the system, an anti-cavitation check valve may be employed. The valve can be installed on each cylinder port of any operating section where required. When the system pressure is less than tank pressure, a vacuum is created. The anti-cavitation check valve equalizes the unbalanced pressure condition by metering fluid from the tank passage back to the pressure port. The anti-cavitation check valve is located in valve operating sections next to the cylinder ports and function when the spool is in neutral and operating position.

2. Anti-Cavitation Check With Cylinder Port Relief Valve - The anti-cavitation check with cylinder port relief valve is a combination of anti-cavitation check valve with an integral cylinder port relief valve sub-assembly. The operation of the anti-cavitation check feature is described in paragraph VII, A, 1. The cylinder port relief sub-assembly limits the maximum pressure in the cylinder port. The relief sub-assembly normally functions when the valve spool is in the neutral position. Fluid is discharged from the cylinder port to the tank passage of the directional valve. The pressure setting is generally higher than the main system relief valve. The relief valve sub-assemblies are pre-set at the factory.

SECTION VIII-TESTING

Vickers Mobile Division application engineering personnel should be consulted for recommendations on test stand circuit requirements and construction. If test equipment is available, valves should be tested at the recommended flow and pressure shown on installation drawings M-259218 and M-259219.

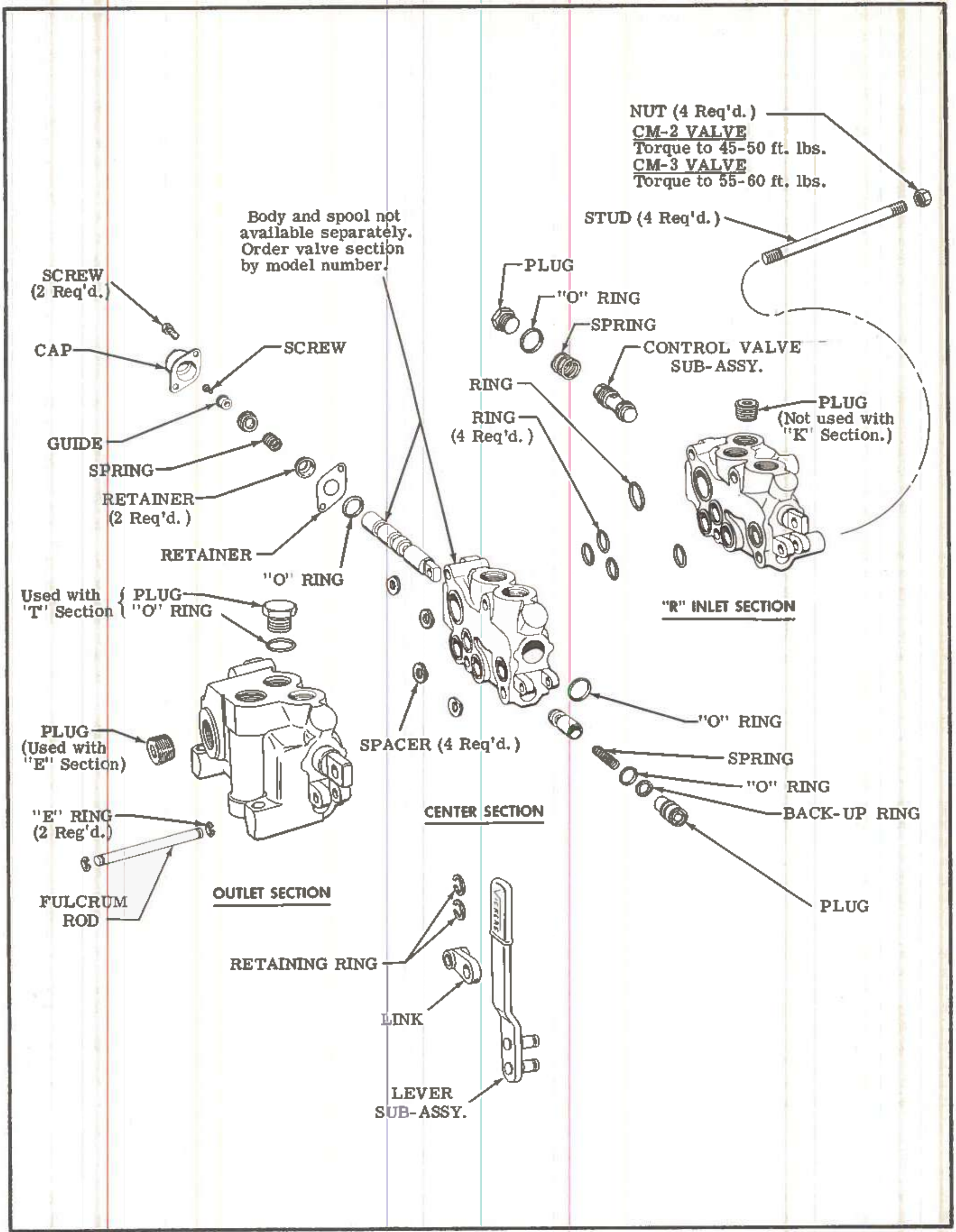
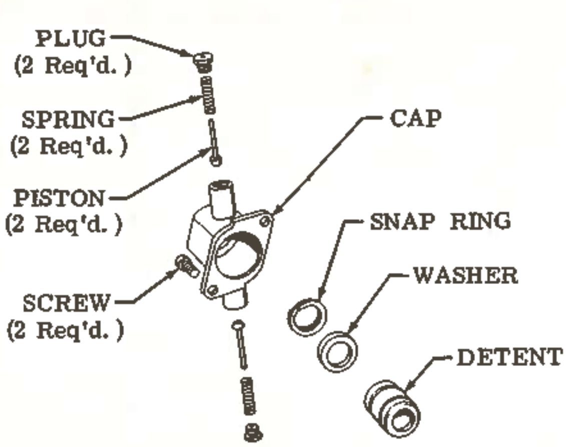
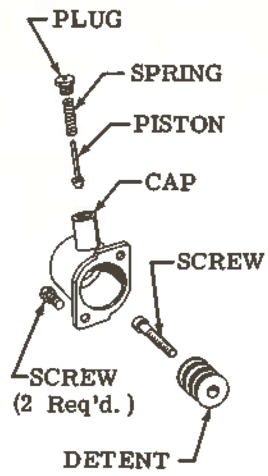

NUT (4 Req'd.)
CM-2 VALVE
Torque to 45-50 ft. lbs.
CM-3 VALVE
Torque to 55-60 ft. lbs.
STUD (4 Req'd.)
Body and spool not available separately. Order valve section by model number.
SCREW (2 Req'd.)
CAP
SCREW
PLUG
"O" RING
SPRING
CONTROL VALVE SUB-ASSY.
RING
RING (4 Req'd.)
PLUG (Not used with "K" Section.)
GUIDE
SPRING
RETAINER (2 Req'd.)
RETAINER
"O" RING
"R" INLET SECTION
Used with "T" Section { PLUG "O" RING
"O" RING
SPRING
"O" RING
BACK-UP RING
PLUG
PLUG (Used with "E" Section)
SPACER (4 Req'd.)
CENTER SECTION
"E" RING (2 Reg'd.)
FULCRUM ROD
OUTLET SECTION
RETAINING RING
LINK
LEVER SUB-ASSY.

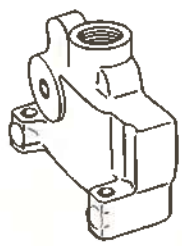
Figure 9



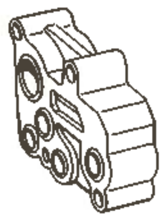
DETENT USED ON "C" FLOAT SECTION



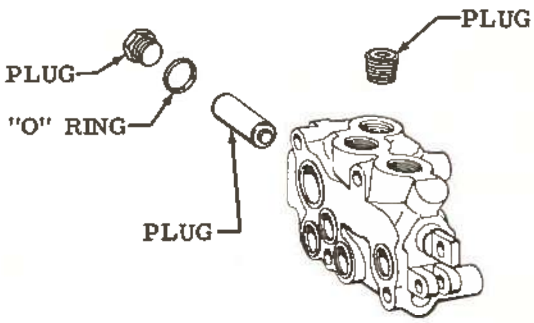
DETENT USED ON "I" SECTION



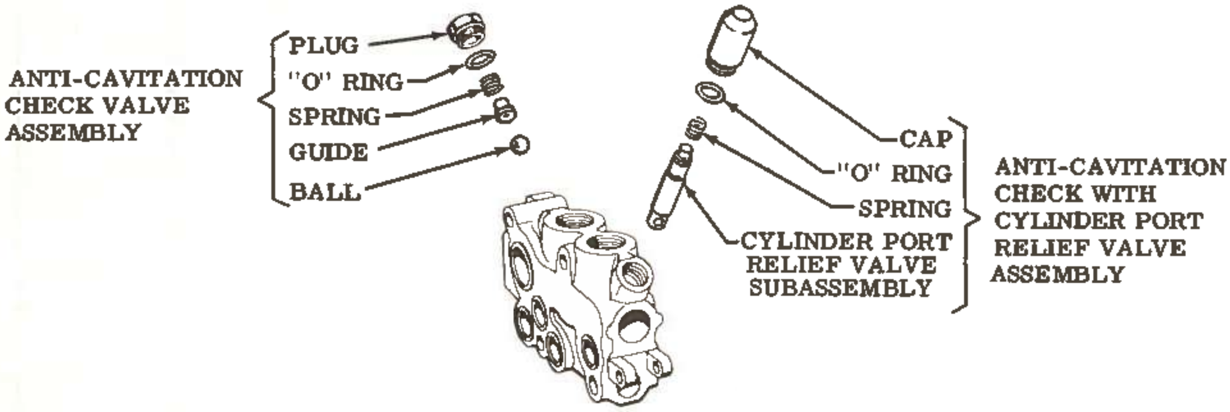
"L" SECTION



"U" SECTION



"F" INLET SECTION



CHECK AND CYLINDER PORT RELIEF OPTIONS

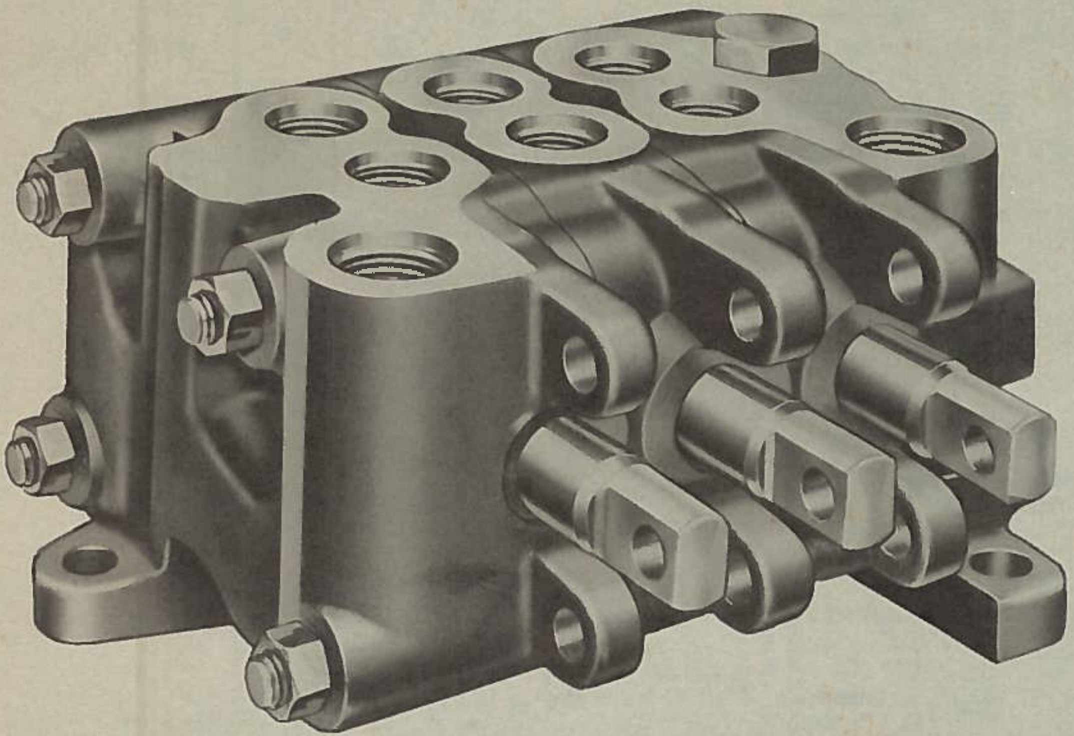
Figure 9A

VICKERS®
A TRINOVA COMPANY

Overhaul Manual

Multiple Unit Valves

CM11 Series -21 Design



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SECTION I - INTRODUCTION

A. PURPOSE OF MANUAL

Service information in this manual covers the principles of operation, installation, maintenance and repair of Vickers CM11 Series, -21 design Multiple Unit Valves.

B. GENERAL INFORMATION

Service parts information for these valves is contained in Parts Catalog M-1729-S. Oil recommendation information is shown on data sheet M-2950-S. dimensions are on installation drawing 303. Copies are available on request from your local Vickers application engineering office or from: Vickers, Incorporated 1401 Crooks Road, Troy, Michigan 48408

Table I is a complete breakdown of the model code covering these units. Service inquiries should always include the complete model numbers which are stamped on the valve bodies.

TABLE I - MODEL CODE BREAKDOWN

CM 11 ZS 1 -R 25 V ** * L - 21 *****

CM — MULTIPLE UNIT CONTROL VALVE

11 — SERIES

ZS — VALVE BANK MODIFICATION
- NO - NO MODIFICATION
- ND - STANDARD SECTIONS - DUST COVERS
- NS - STANDARD SECTIONS - ELECTRIC SWITCH ACTUATORS
- ZO - NARROW BYPASS SECTIONS NO MODIFICATIONS
- ZD - NARROW BYPASS SECTIONS DUST COVERS
- ZS - NARROW BYPASS SECTIONS ELECTRIC SWITCH ACTUATORS

1 — PORT CONNECTIONS
- 1 - 7/8-14 UNF - 2B INLET AND DISCHARGE PORTS - 3/4-16 UNF - 2B CYLINDER PORTS
- 2 - 1 1/16-12 UNF - 2B INLET & DISCHARGE PORTS - 7/8-14 UNF - 2B CYLINDER PORTS

R — INLET BODY TYPE
- F - CARRYOVER PORT - NO RELIEF VALVE
- R - STANDARD - RELIEF VALVE (PARTIAL FLOW BYPASS)
- K - STANDARD - RELIEF VALVE (FULL FLOW BYPASS)
- J - STANDARD - RELIEF VALVE (PARTIAL FLOW BYPASS)

25 — SYSTEM RELIEF VALVE SETTING - PSI

05 - 500 PSI	12 - 1250 PSI	20 - 2000 PSI
07 - 750 PSI	15 - 1500 PSI	22 - 2250 PSI
10 - 1000 PSI	17 - 1750 PSI	25 - 2500 PSI

V** — ADJUSTABLE SYSTEM RELIEF VALVE SETTING - PSI (OMIT IF NOT REQUIRED)

V05 - 500 PSI	V12 - 1250 PSI	V20 - 2000 PSI
V07 - 750 PSI	V15 - 1500 PSI	V22 - 2250 PSI
V10 - 1000 PSI	V17 - 1750 PSI	V25 - 2500 PSI

** — SPOOL TYPE
- A6 - COUNTERBALANCE
- B - MOTOR
- C - FLOAT
- D - DOUBLE ACTING
- D3 - DUAL FUNCTION
- D4 - SPECIAL METERING
- D5 - COMBINED & B SPOOL FUNCTIONS
- T - SINGLE ACTING
- W3 - SAFETY INTERLOCK

* — SPOOL MODIFICATION (OMIT IF NOT REQUIRED)
- 1 - DETENT FOR ANY SPOOL
- 2 - LIGHT CENTERING SPRING
- 7 - HALF LOAD CENTERING SPRING

L — OUTLET BODY TYPE
- L - STANDARD
- E - CARRYOVER PORT
- E1 - E SECTION WITH ADDITIONAL OUTLET PORT

21 — DESIGN

*** — SPECIAL FEATURE

SECTION II - DESCRIPTION

A. GENERAL

The CM11 - 21 Series Valves are made up of directional control valve sections mounted in banks and connected internally to common pressure and tank return passages. A valve bank usually consists of an inlet and operating (R*, K* or F*), a number of operating sections (*) and an operating and outlet section (*L or *E). Each operating section contains a sliding spool (for example A, B, C, T, D or W spool). In valve banks where only one operating section is required, an R* section is used with an L or E tank plate section.

B. ASSEMBLY AND CONSTRUCTION

Figure 1 is a cross-sectional view showing the construction and assembly of a three-section valve. Each section contains a sliding spool with centering springs and a check valve. The inlet section also contains a relief valve assembly.

Passages between the bodies connect each section to the common inlet and tank ports. Seal rings between the sections seal the connecting passages. Sections are held together by studs and nuts.

C. OPTIONAL FEATURES

1. Micro-switch attachment - CM11*S models are equipped with a switch mounting bracket and a cam extension on the spool to actuate a micro-switch when the spool is shifted (see Section IV, paragraph F).

2. Spool detents - A spool detent assembly consists of a special end cap with a spring loaded plunger and a spool extension. The plunger engages in grooves in the spool extension to hold the spool in the desired position.

D. MOUNTING

CM11 Series -21 design valves are mounted with lugs cast into the inlet and outlet sections.

E. APPLICATION

Vickers application engineering personnel should be consulted for valve ratings and applications.

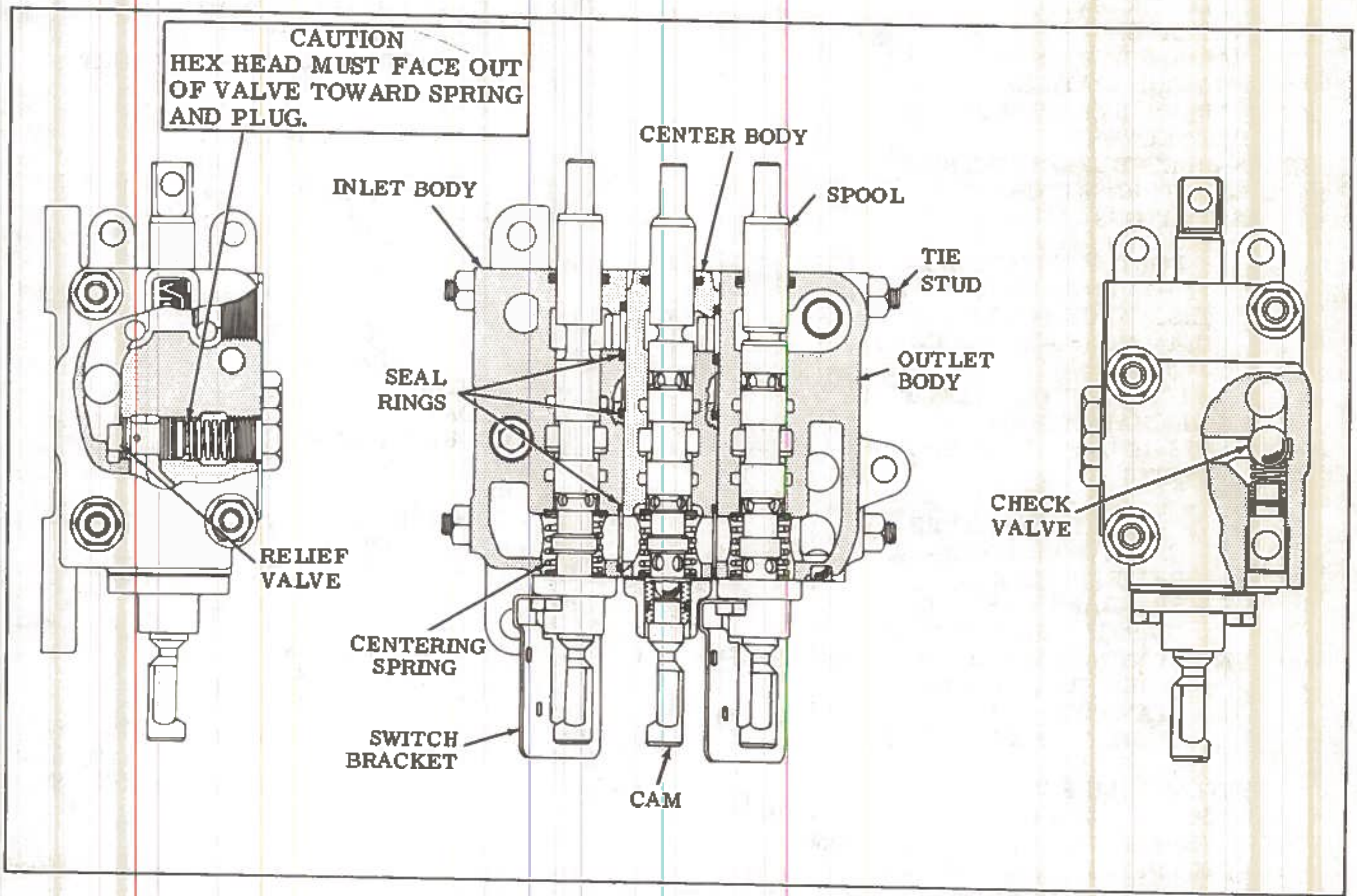


Figure 1

SECTION III - PRINCIPLES OF OPERATION

A. GENERAL

Figure 2 is a schematic illustration of a three section valve, showing the inlet and outlet ports and the by-pass, pressure and tank passages. The pressure passage is used to carry fluid to the cylinder ports when the spools are shifted. The by-pass passage permits flow directly to the outlet when the spools are not being operated. The tank passage also carries fluid to the outlet; either return flow from the cylinder ports or fluid diverted past the flow control and relief valve.

The spools are shown in the centered or neutral position. Under these conditions, fluid in the pressure passage is blocked from the cylinder ports by the spool lands. Flow through the valve is through the by-pass and tank passages to the outlet.

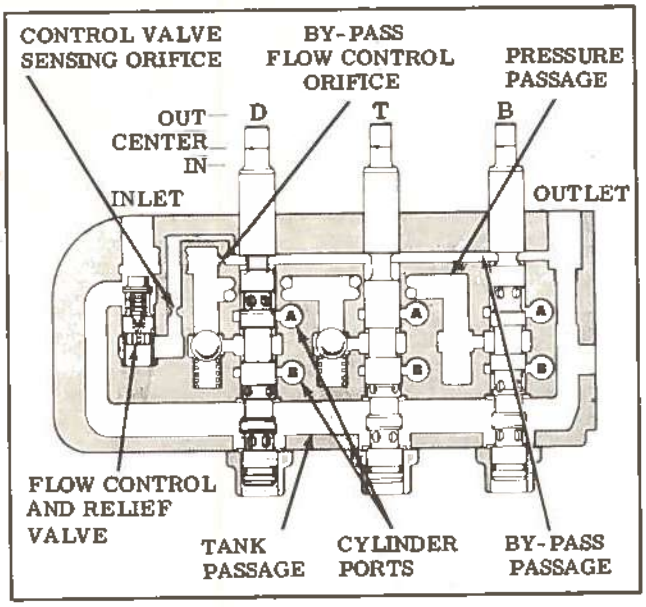


Figure 2

B. OPERATING SECTIONS

1. Inlet Sections - The CM11-21 Series valve bank may be obtained with operating, R*, F*, or K*, inlet sections. These sections are available with the spools listed in Table I.

These sections are individually described below.

(a) R* Section - The R* section is equipped with an integral relief valve for overload protection. It is built to accept a check valve to prevent return flow through the valve.

The integral relief valve, with an orifice plug, also acts as a partial flow control valve. This feature lowers the pressure drop between the inlet and outlet ports. (See paragraph 4 for relief valve and flow control operation.)

The relief valve cracking pressure is pre-set at the factory. The pre-set cracking pressures range up to 2500 psi maximum. (See Table I Model Code for pressure settings.)

(b) F* Section - The F* section has two pressure connections. One connection is made to the pump source and the second connection is made with a preceding valve assembly to accept the by-pass flow for tandem operation.

The F* section like the R* section is built to accept a check valve to prevent return flow when this feature is required. However, F* sections do not employ relief valve or partial flow by-pass.

(c) K* Section - The K* section is essentially the same as the R* section except it has a full by-pass feature.

2. Outlet Sections

(a) *L Section - When two or more spools are required in a valve bank, the last section will be an *L section. The "*" denotes the spool type. This section contains the exhaust oil port and also is built to accept a check valve to prevent back flow when this feature is required.

(b) *E Section - This section is used for tandem operation by providing an outlet connection through which the by-pass feature for pump unloading is extended on to a subsequent valve bank. It is used in conjunction with an "F*" type inlet section in the next valve bank. Like the *L section it contains an operating spool and is built to accept a check valve to prevent back flow when this feature is required.

3. Spool Operation

Six standard spool designs are available (A, B, C, D, T and W). Any combination of spools may be used with a valve bank to perform a variety of operations. All operating spools are equipped with centering springs which return the spools to neutral.

For convenience, U. S. A. S. I. symbols are shown with the following descriptions of each spool.

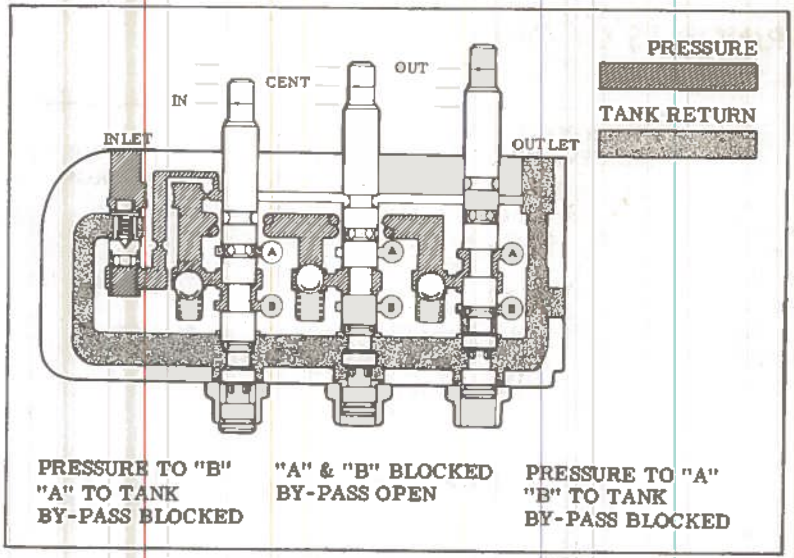


Figure 3 "D" DOUBLE ACTING SPOOL

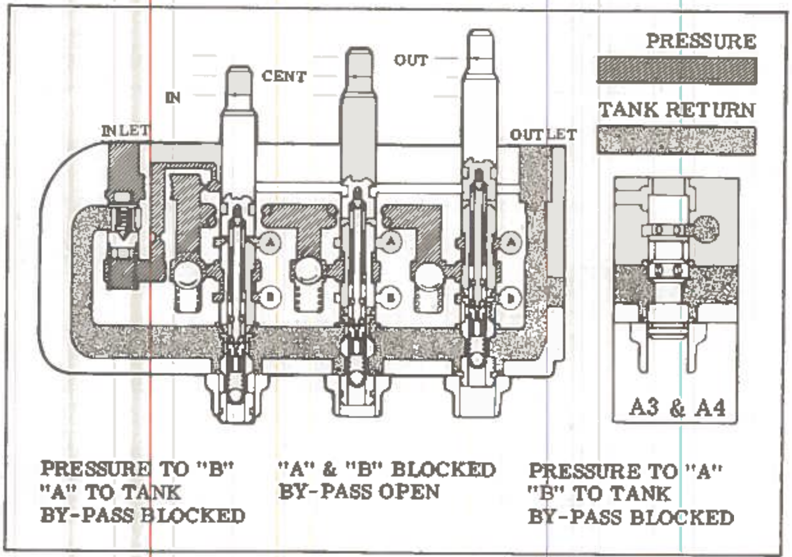


Figure 4 "A" DOUBLE ACTING SPOOL

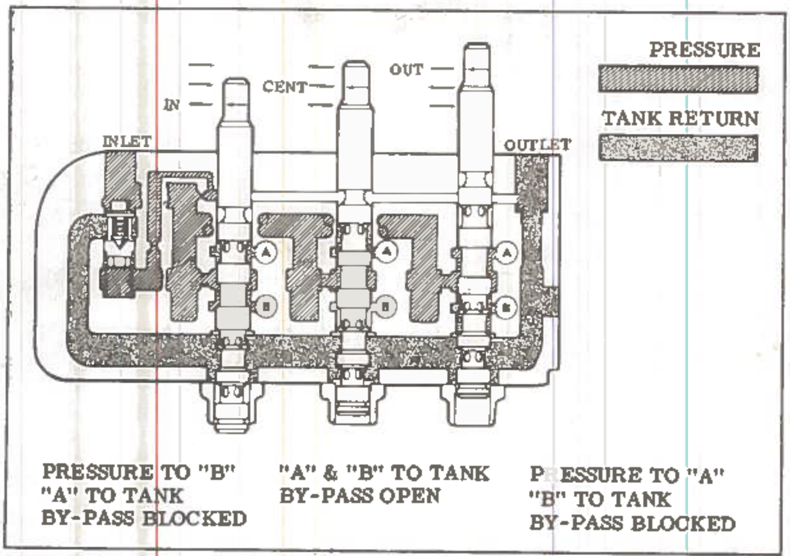
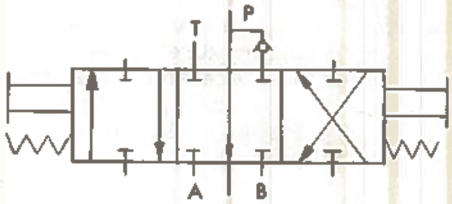


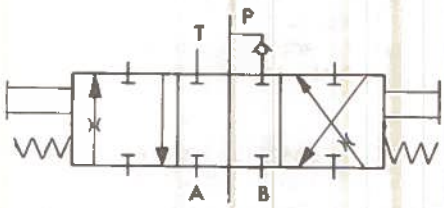
Figure 5 "B" MOTOR SPOOL

(a) "D" Double Acting Spool - "D" spools are used for applications where pump flow must be directed to either end of a cylinder, depending on the direction of movement required. The end of the cylinder not under pressure has its return flow directed to reservoir via internal coring of the valve sections. See Figure 3 for spool position versus flow.

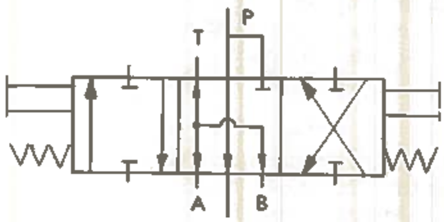


(b) "A" Double-Acting Spool - The "A" spool is a double-acting spool with variable orifices. An internal spool is used to provide this variable restriction. So long as there is a positive inlet pressure, the orifice is large, permitting unrestricted return flow. Decreased inlet pressure permits the spool to shift, decreasing the orifice size.

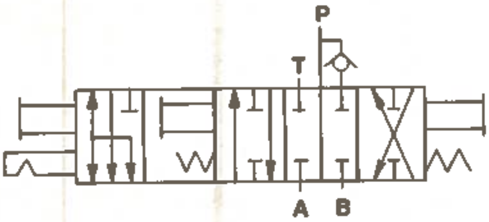
(c) "A3" and "A4" Spools - These are double-acting spools with fixed orifices to restrict flow to the reservoir from either cylinder port (see Figure 4). This prevents losing control of the load. Operation is otherwise the same as the "D" spool. See sub-paragraph (a) above.



(d) "B"-Motor Spool - "B" spools are used when flow is directed to the operation of a hydraulic motor instead of a cylinder. These spools are double acting in character so that the motor may be rotated in either direction. The cylinder ports are left partially open in the neutral position to allow free flow of oil between the motor and reservoir. Check valves are not used in "B" spools. See Figure 5 for spool position vs. flow characteristics.



(e) "C" Float Spool - "C" spools are double acting with an additional float position. The spool is retained in the float position by a detent, and it is spring centered to neutral from the "in" and "out" positions. Both cylinder ports are open to the reservoir in the float position to permit free flow of oil in either direction. See Figure 6 for spool position versus flow.



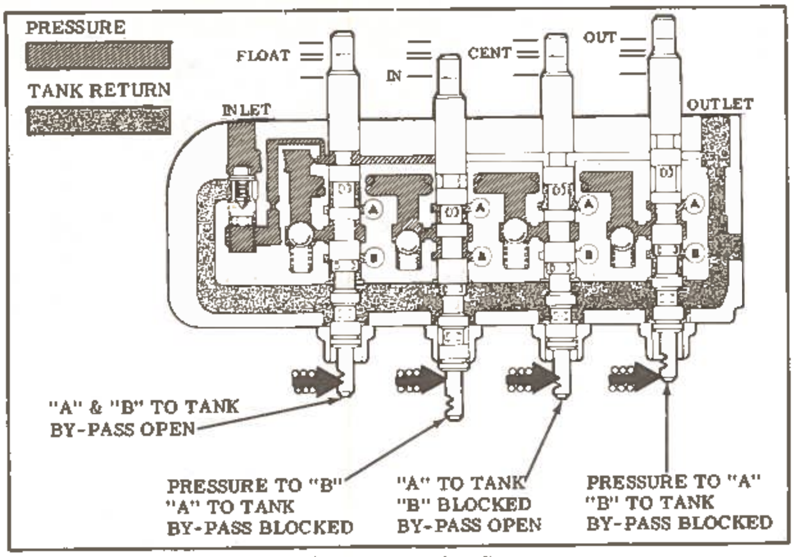
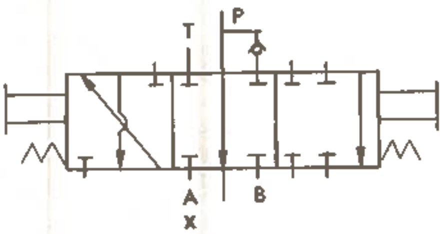


Figure 6 "C" FLOAT SPOOL

(f) "T" Single Acting Spool - "T" spools direct flow to one end of an operating cylinder only as in the example of the lift mechanism on a fork-type truck. Return flow is from the same end of operating cylinder and relies on gravity or mechanical means. Flow is controlled to and from port B. Port A is plugged. See Figure 7 for spool position versus flow.



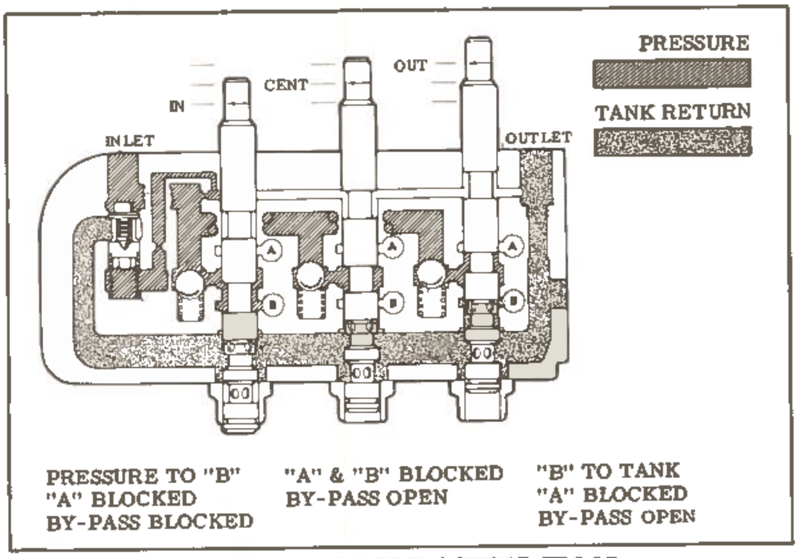
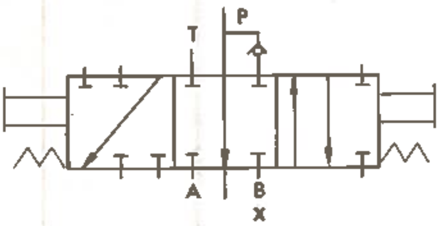


Figure 7 "T" SINGLE ACTING SPOOL

(g) "W" Single Acting Spool - The "W" spool is a single-acting spool which operates the reverse of the "T" spool explained above. Flow is controlled to and from port A, and port B is plugged.



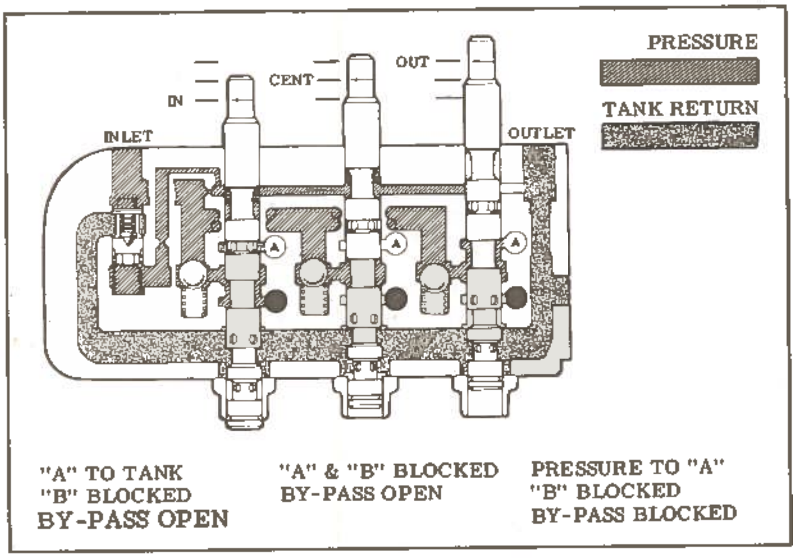


Figure 8 "W" SINGLE ACTING SPOOL

4. Flow Control and Relief Valve

Earlier design valves were equipped with simple relief valves in the inlet sections. The partial flow by-pass system in the CM11-21 valve makes use of a compound type flow control and relief valve arrangement.

By sensing the pressure drop across an orifice at the entrance to the by-pass, the valve acts as a flow control to limit flow through the by-pass to approximately seven gallons per minute. The balance of the pump delivery is diverted through the reservoir passage. This arrangement greatly reduces pressure drop through the valve in the neutral position.

When a spool is shifted to operate a portion of a machine, the flow control is inoperative and full pump volume is available to the system. The control valve then functions as an overload relief valve. System pressure is limited to a prescribed maximum by the action of this valve. Inlet body type "F" (Table I), is not equipped with a relief valve. Full pump volume is available to the system at all times.

(a) Flow Control - Figure 2 shows the valve operation in neutral with flow in excess of seven gpm. Flow across the by-pass orifice results in a pressure drop. The decreased pressure is sensed at the spring end of the valve sub-assembly through a sensing orifice. The slightly higher pressure at the other end of the valve permits it to shift down, diverting excess flow to the reservoir passage. With flow less than seven gpm, there would be negligible pressure drop across the by-pass orifice. Then the control valve would be held closed by the large spring and all flow would be through the by-pass passage.

(b) Relief Valve - Operation of the relief valve feature is shown in Figure 9. When an operating spool is shifted, fluid is ported into the system and the by-pass is blocked.

Figure 9A shows operation at less than the relief valve setting. There is no flow over the by-pass orifice, so full system pressure is sensed at the spring end of the control valve, as well as the opposite end. The valve is thus hydraulically balanced and the large spring holds the relief valve spool closed.

Maximum pressure is determined by the setting of the small spring inside the control valve assembly. When system pressure is high enough to overcome this heavy spring, the poppet is forced off its seat. (See Figure 9B.) Fluid immediately flows past the poppet to the tank passage. This flow creates a pressure drop across the sensing orifice and the control valve is no longer hydraulically balanced. When pressure drop across the sensing orifice is great enough to overcome force of the large spring, the valve spool shifts, permitting flow to the tank passage.

5. Check Valves - Timing of the valve spools is such that one cylinder port opens to pressure and the other port opens to reservoir before the by-pass passage is completely blocked. To prevent return

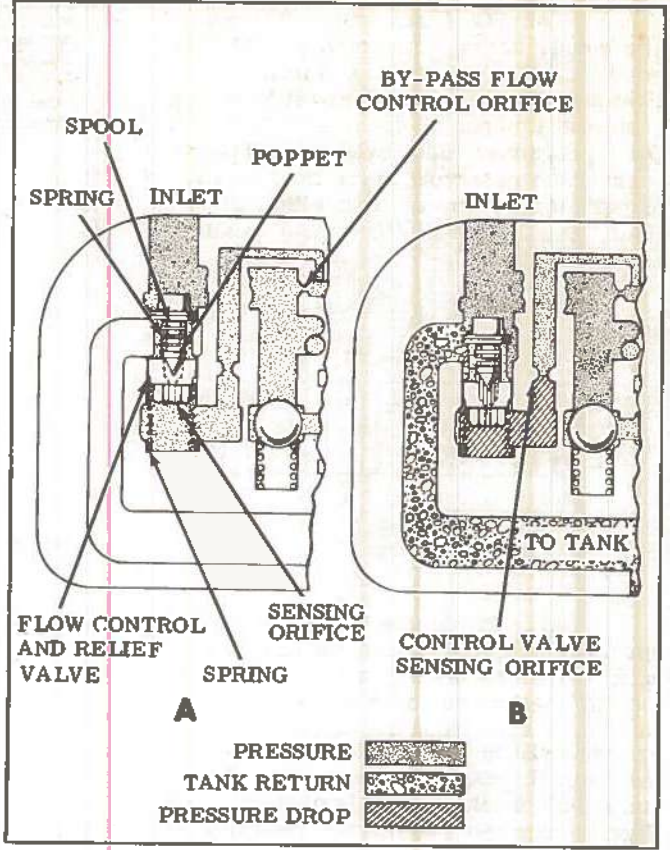


Figure 9

flow from a cylinder port from passing into the pressure passage and escaping through the partially closed by-pass, check valves are provided in each operating section except sections with "B" spool. The check valves prevent the load from dropping.

6. Detent - The spool detent consists of a special end cap with a spring loaded plunger. The plunger engages in a groove in the spool extension and holds the spool in the desired position.

7. Tandem Operation - Tandem operation permits operation of two banks of valves from the same pumping source. An internal plug in the outlet section of the first bank (Figure 10) separates the by-pass passage from the tank passage. Cylinder exhaust oil is returned to tank via the alternate discharge port, and by-pass oil is directed out the primary discharge port to the by-pass port of the bank.

In Figure 10, either bank can be operated separately or both simultaneously. This is possible because of the tandem by-pass connection from the inlet connection of the first bank to the F inlet connection of the second bank. If neither bank is operating, part of the fluid flows through both by-pass passages directly to reservoir. The balance is diverted through the tank passage of the first section as shown in Figure 2.

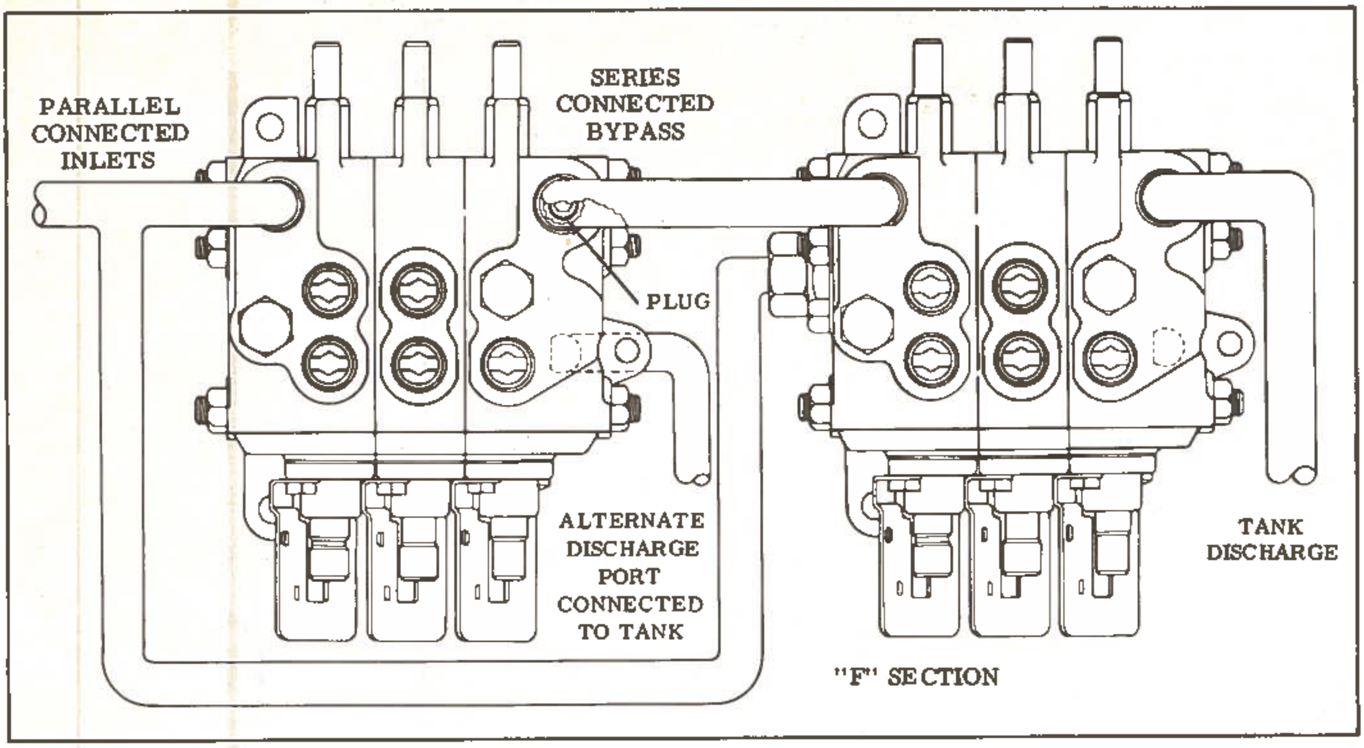


Figure 10

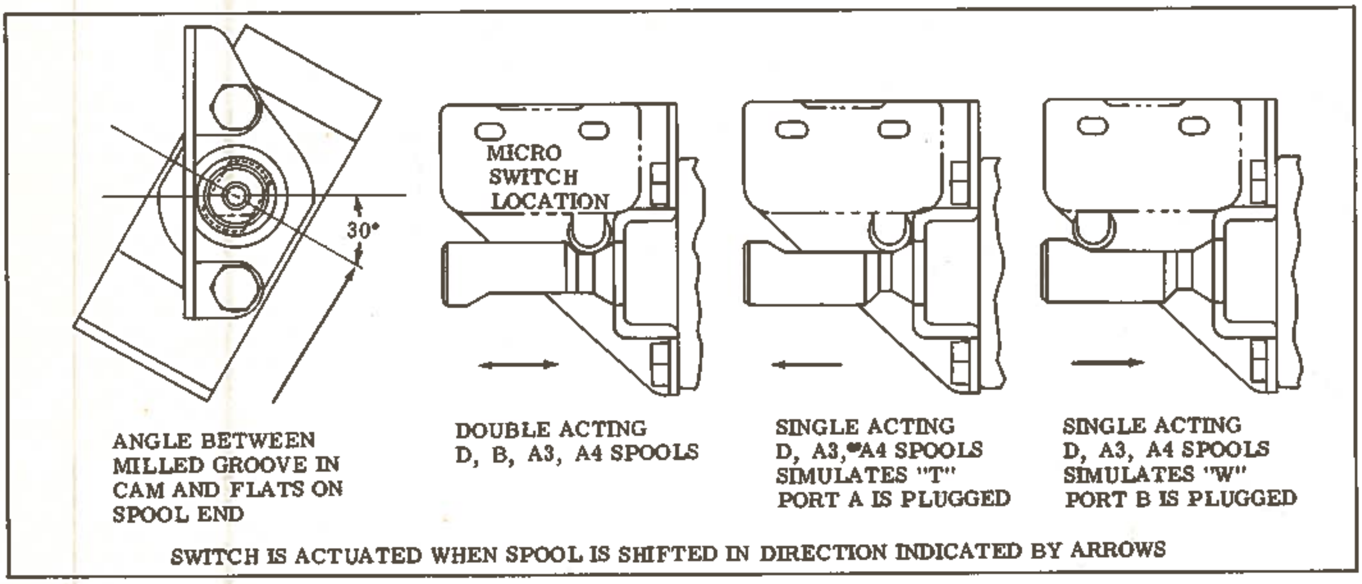


Figure 11

In some cases, it is desirable to have tandem valves connected in series where the second bank is dependent upon the operation of the first bank. The first bank has control priority because the tandem by-pass connection is not used. The cylinder by-pass oil of the first bank is directed out of primary discharge port to the inlet port of the second bank. Use a "K" inlet section in the first bank if full flow is desired to the second bank. Otherwise reduced flow will be encountered.

8. <u>Electric Switch Section</u> - Provision is made to actuate a switch to start the hydraulic power source on electric powered machines only when it is needed. For "T" spool operation, the "A" port must be plugged. "W" spool operation requires that port "B" be plugged.

All D, T or W electric limit switch models are supplied with "D" spools only. "T" or "W" spool operation is accomplished by mounting the switch or rotating the spool extension as shown in Figure 11.

9. Narrow By-Pass Sections - Narrow by-pass sections have narrower by-pass grooves in the spools. These provide better metering for low volume applications.

C. NON-OPERATING SECTIONS

The CM11-21 valve non-operating sections are the "E" and "L" outlet sections. These sections do not have operating spools. The functions of these sections are as follows:

1. "E" Outlet Section - The "E" type section provides an outlet section by which the by-pass feature for pump unloading is extended to a subsequent valve bank (tandem operation). It is generally used in conjunction with the "F" type inlet section on the subsequent valve bank assembly. This "E" type section is only used with one-spool banks.

2. "L" Outlet Section - The "L" type section is basically the same section as the "E" section except it provides only one connection for exhaust oil and is used as the last section on a single-spool bank where tandem operation is not required.

NOTE

It should be noted that the pressure drop across the valve, when used in series operation, will be the sum of the pressure drops for each section.

SECTION IV - INSTALLATION AND OPERATING INSTRUCTIONS

A. INSTALLATION DRAWINGS

Installation drawing 303 should be consulted for installation dimensions.

B. MOUNTING

These valves can be mounted in any position. Enough clearance must be left to provide access to the port connections and to permit actuating the control mechanism. The valves should be securely bolted to the mounting surface.

NOTE

Valves should be mounted on a relatively flat surface to prevent possible distortion of the valve bodies.

C. PORT CONNECTIONS

Except for the alternate discharge port, all connections are compatible with standard SAE fittings and "O" ring seals. It is only necessary to tighten fittings so that there is a firm metal-to-metal contact.

D. RELIEF VALVE

Relief valve sub-assemblies in the inlet section are preset and tested by Vickers for given pressure settings. Selection of the relief valve setting is based on the work requirements of the system. If a different relief valve setting is required, the valve sub-assembly should be replaced.

E. TANDEM INSTALLATION

1. Port connections for tandem series operation are shown in Figure 10.

2. The outlet section of the first bank must be an "E" section which is equipped with a plug (see Figure 10) to block the primary discharge port from the reservoir. The alternate discharge port must be connected to the reservoir.

NOTE

Slight leakage past the internal plug is permissible. The plug should not be tightened excessively, as there is the danger of distorting the body and causing the spool to bind.

F. MICRO-SWITCH AND CAM INSTALLATION

1. Figure 11 illustrates the correct mounting positions for the micro-switch, bracket and cam.

2. To convert a standard section to an electric switch section, the end cap screws must be removed to attach the bracket. The cam must be pressed into the spool at the correct angle with the flats on the spool end as shown in Figure 11. Secure cam in spool with a good grade of epoxy adhesive.

CAUTION

Use caution while inserting cam into spool to avoid damaging nylon cam.

G. HYDRAULIC TUBING

1. The number of bends in tubing must be kept to a minimum to prevent excessive turbulence and friction of oil flow.

2. Tubing must not be bent too sharply. The minimum radius for bends is three times the inside diameter of the tube.

3. To minimize flow resistance and the possibility of leakage, only as many fittings and connections as are necessary for proper installation should be used.

4 All tubing must be thoroughly cleaned before installation to remove dirt, rust and scale. Recommended methods of cleaning are sand blasting, wire brushing and pickling.

NOTE

For instructions on pickling, refer to Vickers Instruction Sheet M-9600.

H. HYDRAULIC FLUID RECOMMENDATIONS

GENERAL

The oil in a hydraulic system serves as the power transmission medium. It is also the system's lubricant and coolant. Selection of the proper oil is a requirement for satisfactory system performance and life. Oil must be selected with care and with the assistance of a reputable supplier.

Refer to Vickers oil recommendations for mobile hydraulic systems, data sheet M-2950-S.

Where special considerations indicate a need to depart from the recommended oils or operating conditions, see your Vickers sales representative.

SECTION V - SERVICE, INSPECTION AND MAINTENANCE

A. SERVICE TOOLS

No special tools are required to service Vickers CM11-21 series, multiple unit valves.

B. INSPECTION

Periodic inspection of spool operation, oil condition and pressure connections saves time-consum-

TABLE III - TROUBLE, CAUSE AND REMEDY CHART

TROUBLE	PROBABLE CAUSE	REMEDY
Oil leaks at either end of spool.	Defective "O" rings in valve body.	Replace "O" rings.
Spring-centered spools do not return to neutral.	Broken springs.	Replace springs.
	Bent spool.	Replace with new section of same size and type.
	Foreign particles.	Clean system and valve.
	Misalignment of operating linkage.	Check linkage for binding condition.
	Valve bank improperly torqued.	Retorque nuts to specified ratings.
Detent type spools will not stay in detent position.	Worn detent barrel.	Replace detent barrel.
	Weak or broken detent spring.	Replace detent spring.
No motion, slow or jerky action of hydraulic system.	Relief valve not properly set, or stuck in base and/or worn.	Repair, clean and readjust.
	Dirt or foreign particles lodged between relief valve control poppet and seat.	Disassemble, clean and reassemble.
	Valve body cracked inside.	Replace valve section.
	Spool not moved to full stroke.	Check travel.
No relief valve action (high pressure).	Small particle of dirt plugging orifice in relief valve sub-assembly.	Remove relief valve and check hole. If blocked, clear hole.
	Relief valve sub-assembly installed backwards.	Install properly.
Load will not hold.	Oil bypassing between spool and body.	Replace valve.
	Oil bypassing piston in cylinder.	Repair or replace cylinder.
	Spool not centered.	Refer to above spool remedies.
Load drops when spool is moved from neutral to a power position.	Dirt or foreign particles lodged between check valve ball and seat.	Disassemble, clean and reassemble.
	Scored or sticking check valve.	Replace poppet.

ing breakdowns and unnecessary parts replacement.

1. All hydraulic connections must be tight. Loose connections not only allow leakage, but also permit air to be drawn into the system, resulting in noisy and erratic operation.

2. Spools should return to neutral automatically when the control is released. The standard centering spring force is approximately 28 pounds with the spool in the neutral position, and approximately 56 pounds with the spool in the shifted position. If more force is necessary, the spool may be binding or control linkage may be faulty.

3. System filters and reservoir should be checked periodically for foreign particles. If excessive contamination is found, the system should be drained. The reservoir must be cleaned thoroughly before refilling.

C. ADDING FLUID TO THE SYSTEM

When hydraulic fluid is added to the system, it should be pumped through a 25 micron filter. If such a filter is not available, or practical to use in the field, a funnel with a fine wire screen (200 mesh or better) can be used.

It is important that oil be clean and free of all substance which will cause improper operation and excessive wear of the pump or other hydraulic units in the system. Be sure to purge all air from the system.

D. LUBRICATION

Internal lubrication is provided by system oil.

E. REPLACEMENT PARTS

Only genuine parts manufactured or sold by Vickers should be used as replacement parts for these valves. Only Vickers knows the true quality level required of each part. These are listed in the applicable parts catalogs, copies of which are available on request.

F. TROUBLESHOOTING

Table III lists the difficulties which may be experienced with the unit and hydraulic system. It indicates the cause and remedy for each of the troubles listed. It should always be remembered that pressure and delivery are factors which are usually dependent upon each other. Adequate pressure gage equipment and a thorough understanding of the operation of the complete hydraulic system are essential to diagnose improper operation.

SECTION VI - OVERHAUL

A. GENERAL

During disassembly, particular attention should be given to identification of parts for reassembly. Spools are selectively fitted to valve bodies and must be returned to the same bodies from which they were removed. Valve sections must be reassembled in the same order.

Figure 12 is an exploded view showing the proper relationship for reassembly. Reference is made to these figures in the procedures which follow.

B. DISASSEMBLY

1. Controls - Be sure the unit is not subjected to pressure. Disconnect and cap all lines and disconnect linkage to the spool. If hand levers are used, remove the "E" washers which retain the fulcrum rod and remove the rod, levers and pivot pins.

2. Attaching Parts - Remove the four tie studs and nuts and separate the valve sections. Be careful not to destroy or lose spacers.

3. End Caps - On CM11-21 models remove the micro-switch from the bracket. Remove the two screws which secure the spool end cap and remove the cap (and switch bracket, if used). If the cap has a detent assembly, screw out the detent plug and remove the spring and piston. Remove the "O" ring from the cap.

4. Operating Spool - Slide the spool out of its bore and remove the "O" rings from the groove in the spool and from the valve body around the spool bore. Do not remove the centering spring, retainers or the spool extension unless it is necessary to replace them.

5. Check Valve - Grip the stem of the check valve plug with pliers and pull it out of the valve body. Remove the "O" ring and back-up ring. Remove the spring and ball from the valve body.

6. Relief Valve Sub-Assy - Screw out the plug which retains the relief valve and remove the "O" ring from the plug. Remove the spring and the relief valve sub-assembly. In F* sections, remove the solid plug.

7. Valve Body - Remove the plug and "O" ring from the blocked cylinder port on models with a single acting spool. If the alternate discharge port is plugged, it is not necessary to remove the plug unless the body is to be replaced. On F* bodies, remove the fitting, "O" rings and back-up ring.

C. CLEANING, INSPECTION AND REPAIR

1. Discard all old seals. Wash all parts in a

clean mineral oil solvent and place them on a clean surface for inspection.

2. Carefully remove burrs by light stoning or lapping. Be certain there is no paint or burring on mating surfaces of valve bodies.

3. Inspect the valve spools and bores for burrs and scoring. If scoring is not deep enough to cause objectionable leakage, the surfaces can be stoned or polished with crocus cloth. If scoring is excessive, the valve body and spool must be replaced. Check the valve spool for freedom of movement in the bore.

4. Check the relief valve for smooth movement in its bore. The valve should move from its own weight.

D. ASSEMBLY (Figure 12)

NOTE

Coat all parts with clean hydraulic oil to facilitate assembly and provide initial lubrication. Petroleum jelly can be used to hold seal rings in place on assembly.

1. Valve Body - On models with single-acting spool, install the "O" ring on the port plug and plug the appropriate cylinder port. Tighten the plug securely, but DO NOT over tighten. On F* models, install the back-up ring and then the "O" rings on the fitting. Tighten the fitting securely, but DO NOT over tighten.

CAUTION

Hex head of relief valve must face outside of unit.

2. Relief Valve - Install the "O" ring on the relief valve plug. Place the relief valve assembly in its bore, HEX NUT END UP. Install the spring and plug and tighten the plug securely but DO NOT over tighten.

3. Check Valve - Install a new back-up ring and "O" ring on the check valve plug with the "O" ring toward the spring and ball. Place the ball and spring in the body and install the plug. Be sure the hole in the plug lines up with the stud hole in the body. Check valves are not used in "B" spool sections.

4. Operating Spool - If the centering spring was removed, install the spring and retainers on the spool. Place the "O" ring in the groove around the spool bore and install the "O" ring on the spool. Install the spool in the bore. On electric switch models, be certain the cam extension is in the correct position.

5. End Cap - Install the "O" ring in the end cap groove and install the cap, switch bracket (if used) and attaching screws. Torque the screws securely. On models with detents, grease all the detent parts. Install the end cap and check for proper spool extension alignment. Install the piston, spring and plug. Be sure to screw the plug in all the way.

6. Assembly of Unit

CAUTION

Make sure all mating surfaces of valve bodies are free of burrs and paint.

Install seal rings and the seal ring retainer in the grooves in the body of each inlet and center section. Use petroleum jelly to hold the seals in place. Carefully place the sections together in the same order in which they were removed. Coat the stud threads with "Loctite" or similar sealant and install the studs. Tighten the nuts to 17 pounds foot torque. If levers are used, install pins in each spool and assemble the levers, fulcrum rod and "E" washers.

SECTION VII - TESTING

Vickers, Incorporated application engineering personnel should be consulted for recommendations on test stand circuit requirements and construction. If test equipment is available, valves should be tested at the recommended flow and pressure shown on installation drawing 303.

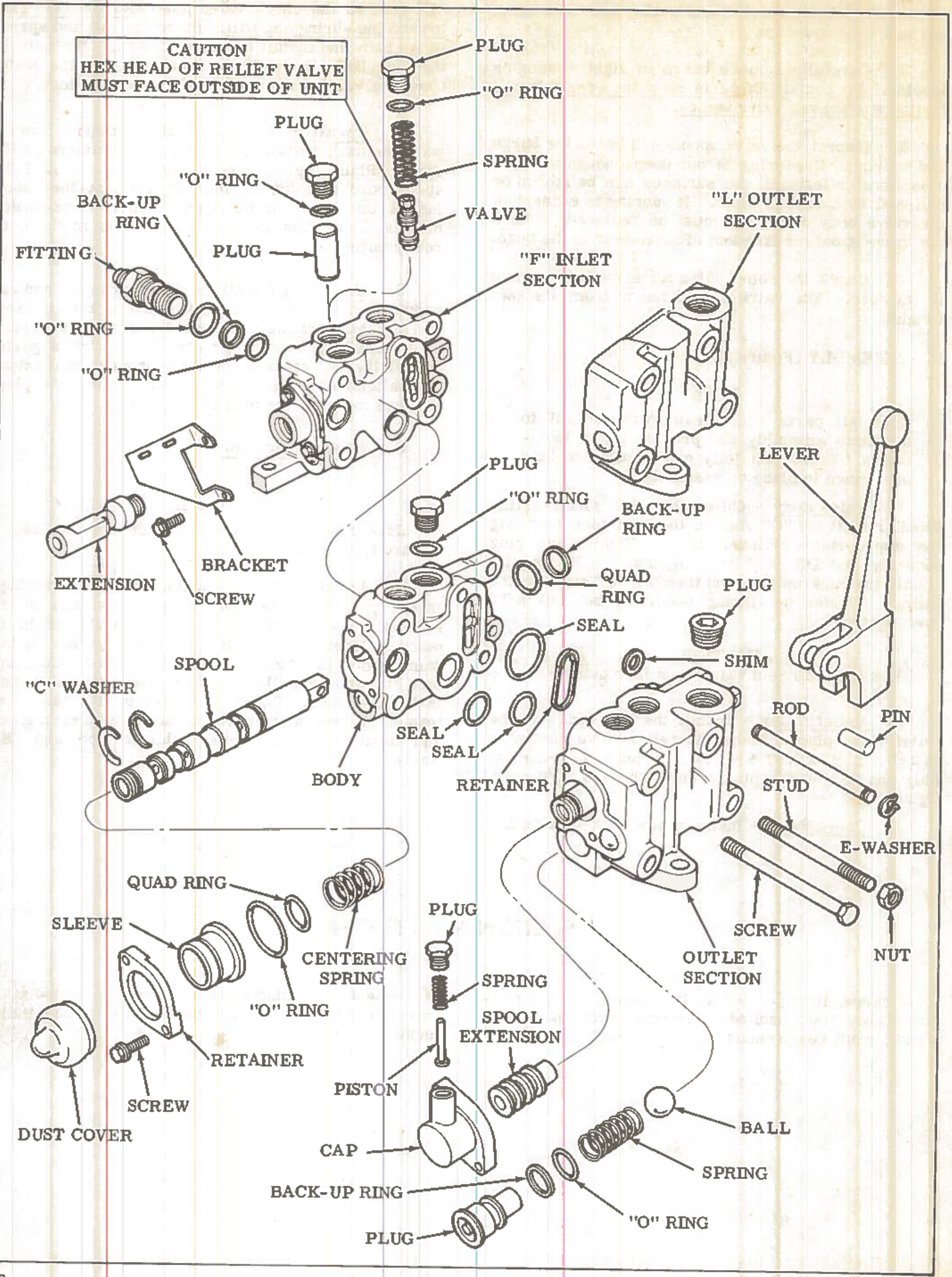

CAUTION
HEX HEAD OF RELIEF VALVE
MUST FACE OUTSIDE OF UNIT
PLUG
"O" RING
SPRING
VALVE
PLUG
"O" RING
BACK-UP
RING
FITTING
PLUG
"F" INLET
SECTION
"L" OUTLET
SECTION
"O" RING
"O" RING
LEVER
BRACKET
EXTENSION
SCREW
PLUG
"O" RING
BACK-UP
RING
QUAD
RING
PLUG
SEAL
SHIM
SPOOL
"C" WASHER
SEAL
SEAL
BODY
RETAINER
ROD
PIN
STUD
E-WASHER
QUAD RING
SLEEVE
CENTERING
SPRING
"O" RING
PLUG
SPRING
SPOOL
EXTENSION
RETAINER
SCREW
OUTLET
SECTION
NUT
PISTON
SCREW
DUST COVER
CAP
BALL
SPRING
BACK-UP RING
"O" RING
PLUG

Figure 12

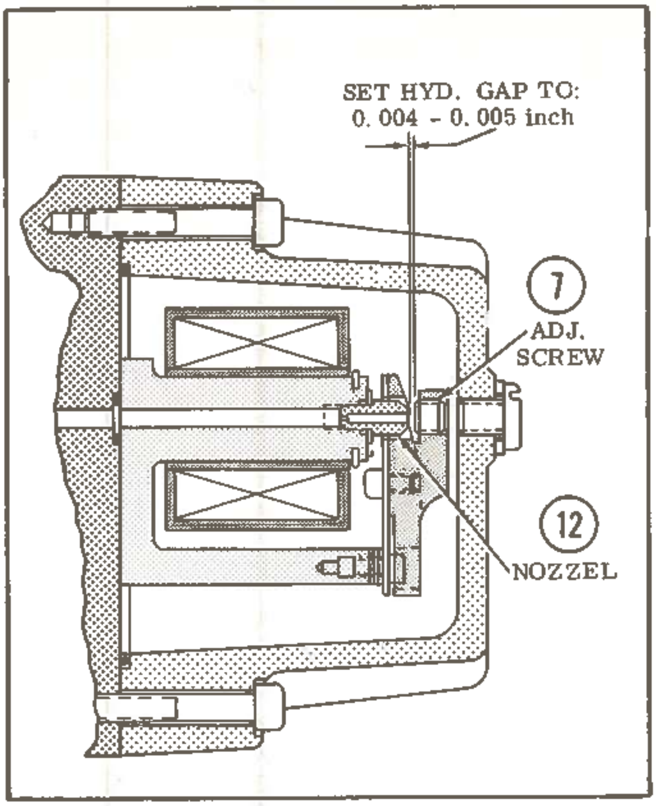


Figure 6. Setting hydraulic gap.

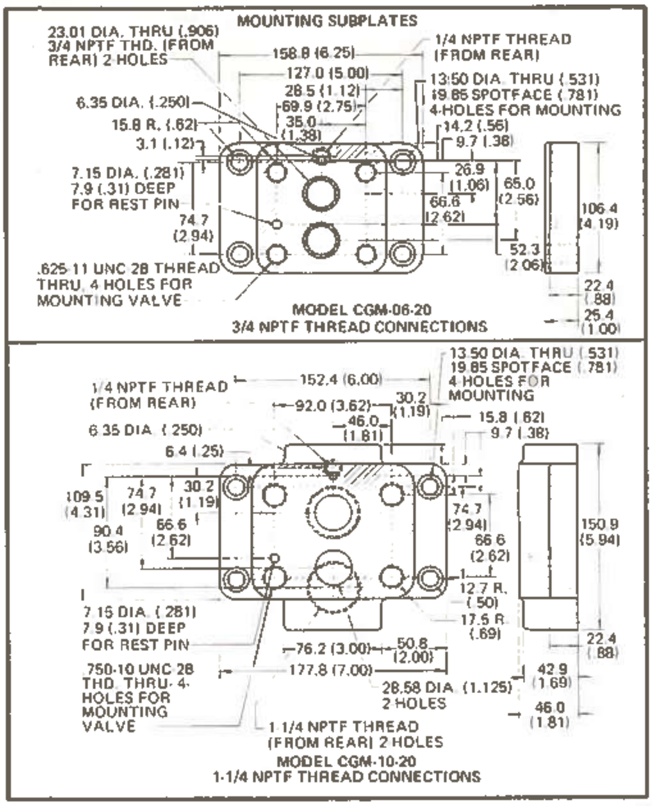


Figure 7. CGE**-*-20 valve mounting data.

7. Install manual relief valve parts (52) through (41) into cover (55). If a new seat (53) was installed, coin piston (50) to seat (53). Use a six inch (6") piece of tubing to hold the piston. Insert piston and tubing into valve until piston rests against seat (53). Gently tap the tubing (while holding tubing centered in the bore); this mates the piston to the seat. Remove piston (50) and tubing, then remove piston from the tubing. Install parts associated with piston into valve, (49) through (41).

8. Install parts (40) through (37). Plug (40) must be below the mounting face of body (38) after installation. Cross torque screws (37) to 42 lb in., (4.7 N.m), maximum.

9. Install check valve parts (36) through (31). If a new ball or seat is used, coin the ball and seat prior to installation.

10. Install plug (30) and blocking valve assembly parts (29a) through (24). Filter screen (28) fits into spool (27) with screen side inward. (Use petroleum jelly to retain filter screen within spool at assembly.) Important: Install button in manual position, (reversed from that shown in figure 3). The blocking valve must prevent flow to the flapper orifice. (Initial test procedure set up).

11. Install parts (23) through (21). Torque screws (21) to 40 lb. in., (4 - 4.5 N.m).

12. Install "O" ring (20) in place over coil (19) wires. Slide coil (19) over frame (22) while inserting wires into body (38) wiring cavity. Gently press "O" ring (20) and wires through body opening until coil bottoms against the screw heads (21) that secure frame (22).

13. Install parts (18) through (12). Dampening shim (13) exists on 1000 PSI models only. Thread nozzle (12) through coil retainer (14) into frame (22). Use a 5 mm open end wrench or a small adjustable wrench to tighten the nozzle. Do not overtighten nozzle (12) or accidently strike the nozzle orifice face with the wrench. Damage to the orifice face could reduce the maximum pressure setting, (due to leakage past the orifice). See figure 5 for location of dampening shim.

14. Assemble leaf spring (9) and flapper plate (S/A) (8) with screws (10). Inspect the leaf spring; if the leaf spring is bowed, position the bow outward. Torque screws (10) to 12-14 lb. in., (1.4 - 1.6 N.m). Screws (10) should straighten the leaf spring against the flapper plate.

NOTE

In the following step, one master shim (11a) (thick) and four adjustment shims (11) (thin) are normally used. The shims set the magnetic gap of the valve.

15. Insert screws (6) and washers (6a) through flapper plate S/A (8) opening into leaf spring (9). Hold screws in place and locate shims over screws against leaf spring (9). Thread screws into frame (22) lightly. Position flapper plate S/A (8) to prevent mechanical contact with side of nozzle (12). Torque screws (6) to 12 - 14 lb. in., (1.4 - 1.6 N.m). Check the magnetic gap as follows:

a. 1000 PSI models:

Refer to figure 5 and carefully measure the distance between leaf spring (9) and dampening shim (13). Use a feeler gage. The distance should be 0.017 to 0.021 inches, (0.43-0.53 mm). Add or remove shims (11) to meet this dimension.

b. 3000 PSI models:

Refer to figure 5 and carefully measure the distance between leaf spring (9) and frame (22). Use a feeler gage. The distance should be 0.035 to 0.037 inches, (0.89-0.94 mm). Add or remove shims (11) to meet this dimension.

16. If adjustment screw (7) was removed from flapper plate (8), thread a new adjustment screw (7) into flapper plate (8).

Measure the hydraulic gap with a feeler gage to set the clearance between nozzle (12) and adjustment screw (7). The gap should be 0.004 - 0.005 inch, (0.10 - 0.13 mm). This applies to 1000 & 3000 PSI models. Refer to Figure 6.

17. Install parts (5) through (1). Cross torque screws (3) to 35-40 lbf. in., (4 - 4.5 N.m).

Sec SAE VII - TEST PROCEDURE

A. TEST CONDITIONS

Hydraulics:

Fluid medium	SAW 10W oil or equivalent
Fluid Temperature	100 ± 5° F.
Maximum Pressure	3500 PSI

TEST VOLUME:

CGE-06	20 USGPM
CGE-10	50 USGPM

B. ELECTRICAL SPECIFICATIONS

An adjustable current source from zero (0) to 500 milliamperes is required. Vickers EMCS-P-30 is recommended. Refer to installation drawing 521557.

C. TEST. (Preliminary Adjustments)

CAUTION

The CGE pilot valve is externally drained through the cover. Connect drain line into the cover with a 0.5625-18 UNF-2B straight thread connection for 0.375 O.D. tubing. Drain line must be full size, unrestricted and connected directly to the reservoir so that it terminates below the fluid level. No other lines are to be connected to this line.

NOTE

System filtration should be 35 micron absolute full flow to prevent contamination of the pilot valve.

1. Before mounting the assembled valve for test, manually move piston (59, figure 4) to full stroke with a hex wrench or similar tool. If piston (59) binds refer to paragraph VI, step E.12. and paragraph VI, step F.6.

NOTE

A suitable subplate is required to mount the valve. A CGE subplate properly piped is recommended. See figure 7.

NOTE

A sample hydraulic and electrical circuit is shown in figure 8. Modify an existing test stand or obtain necessary components to assemble the test circuit.

NOTE

If the valve is an -S6 model, connect a 3000 PSI, 35 micron filter to the main stage of the valve. Filter ports are located on the front side of the main stage. See figure 9.

2. Connect valve to the test circuit and attach power supply (12, figure 8). The connections can be made without regard to polarity.

3. Set dither adjustment on power supply to minimum.

4. Turn power supply current control know to zero (0).

CAUTION

In the following step, if milliammeter (11, figure 8) reads in reverse, reverse the meter connecting wires.

5. Crack the power supply control and observe millammeter for polarity. Correct wiring if necessary. Return control to zero current.

6. Switch directional valve (8, figure 8) to allow flow through flow meter and adjust flow rate for valve under test. (Flow rates tabulated in paragraph VII.A. Test Conditions).

7. Adjust relief valve (2, figure 8) to minimum pressure and open globe valve (1).

8. Switch directional valve to center blocked condition. Gradually close globe valve (1, figure 8) and adjust relief valve (2) until pressure reading on gage (7) is 3750 PSI. Globe valve must be completely closed at completion of this step.

NOTE

Needle valve (6, figure 8) is used as a snubber for gage (7).

D. MANUAL ADJUSTMENT TEST

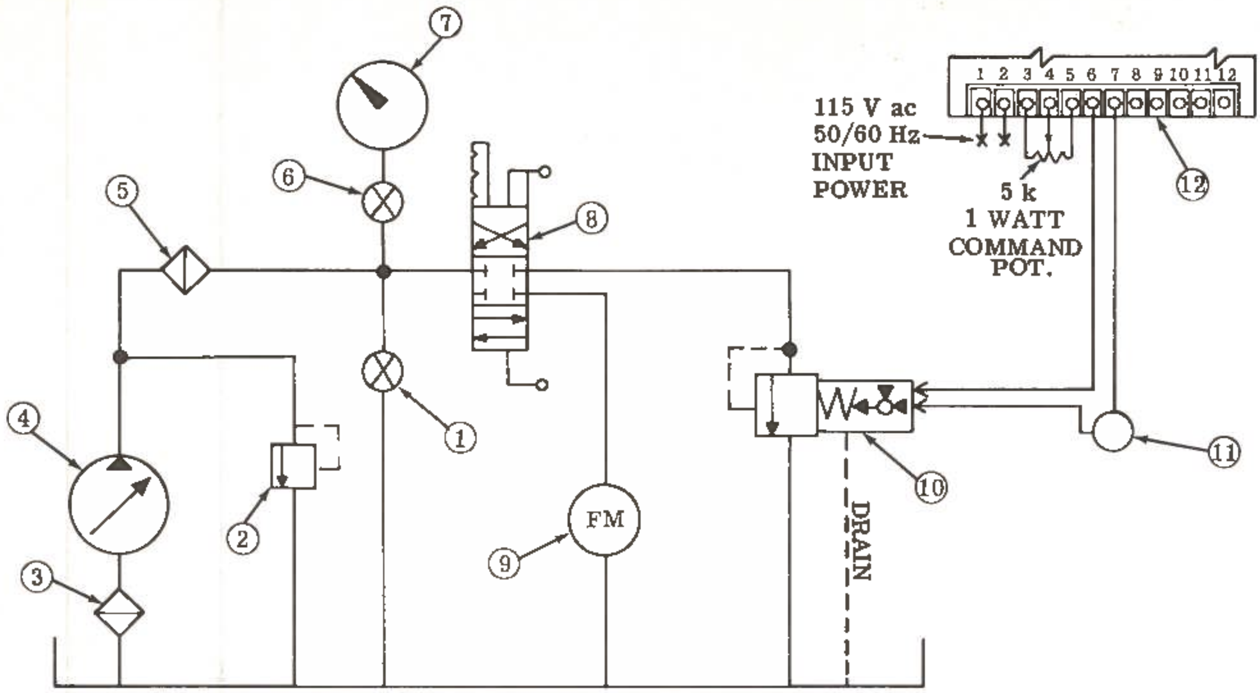
1. Switch directional valve to divert flow through the valve under test (10, figure 8). Turn relief valve adjustment screw (41, figure 3) all the way in. Pressure should be within range "A", perform the following adjustment procedure.

MODEL	"A" PSI	"B" PSI	"C" PSI	"D" $in^3/min.$	"E" PSI	"F" PSI
CGE-**-1	1200/1300	1000	700	15	125	1250
CGE-**-3	3450/3700	3000	2500	45	1500	3500

Table 4.

WARNING

To prevent personal injury, remove all power from the hydraulic system or divert all system flow to the reservoir through flow meter (9, figure 8) when work is performed to the valve under test.



1. GLOBE VALVE
2. TEST STAND RELIEF VALVE
3. INLET STRAINER
4. VARIABLE DELIVERY PUMP
5. INLINE FILTER 35 MICRON
6. NEEDLE VALVE
7. PRESSURE GAGE 0-4000 PSI
8. DIRECTIONAL VALVE
9. FLOW METER
10. CGE VALVE UNDER TEST
11. AMMETER 0-500 mA.
12. POWER SUPPLY (VICKERS EMCS-*-30 OR EQUIVALENT) MUST BE CAPABLE OF DELIVERING A CURRENT OF 0-500 mA THRU A 20 OHM INDUCTIVE LOAD.

Figure 8. Hydraulic Test Circuit for CGE Valve.

NOTE

In the following step, adding shims increase pressure while removing shims decrease pressure.

2. CGE-**-1-2*

Add or remove shims to bring pressure shown on gage (7, figure 8) within range "A" of table 4. Use the 0.025 inch thick shim, (44, figure 3), for a 100 PSI change.

CGE-**-3-2*

Add or remove shims to bring pressure shown on gage (7, figure 8) within range "A" of table 4. Use the 0.025 inch thick shim, (44, figure 3), for a 230 PSI change and the 0.250 thick shim for a 700 PSI change.

3. Turn relief valve adjustment screw to pressure "B" shown in table 4. Check for porosity and external leaks. Drop pressure to value "C" with globe valve 1, (figure 8), and check the leakage from discharge port, not to exceed "D".

4. Adjust relief valve pressure setting from "C" down to "E" then up to "F" for pressure range test. Tighten lock nut (42, figure 3).

5. Switch directional valve (8, figure 8) to divert flow through flow meter.

6. Remove plug (24, figure 3) and reverse button (26, figure 3) to the normal position. Reinstall plug (24) and secure.

E. ELECTRICAL PILOT ADJUSTMENT

1. Switch directional valve (8, figure 8) to divert flow to the valve under test (10, figure 8).

2. Make sure dither is off (dither control fully counterclockwise). Increase current to the valve under test until rated pressure is obtained. The current at this time should be 475 to 500 millamperes for the 3000 PSI models and between 465 and 500 for the 1000 PSI models. If the current is not within this range, remove current, shift directional valve (8, figure 8) to direct oil to the flow meter and remove pilot valve cover (4, figure 3). If the current reading is low, add shims (11, figure 3) as required. If current reading is high, remove shims as needed. Each shim will change the pressure setting approximately 25 PSI on 1000 PSI models and 150 PSI on 3000 PSI models.

3. Adjust the clearance between nozzle (12, figure 3) and flapper adjustment screw (7, figure 3) to be between 0.004 - 0.005 inch, (0.10 - 0.13 mm). Use a feeler gage for this adjustment.

4. Assemble cover (4, figure 3) to the pilot valve with screws (3, figure 3).

5. Repeat steps E.1. and E.2. to verify adjustment. Repeat the complete "Electrical Pilot Adjustment Procedure", until noted results are obtained.

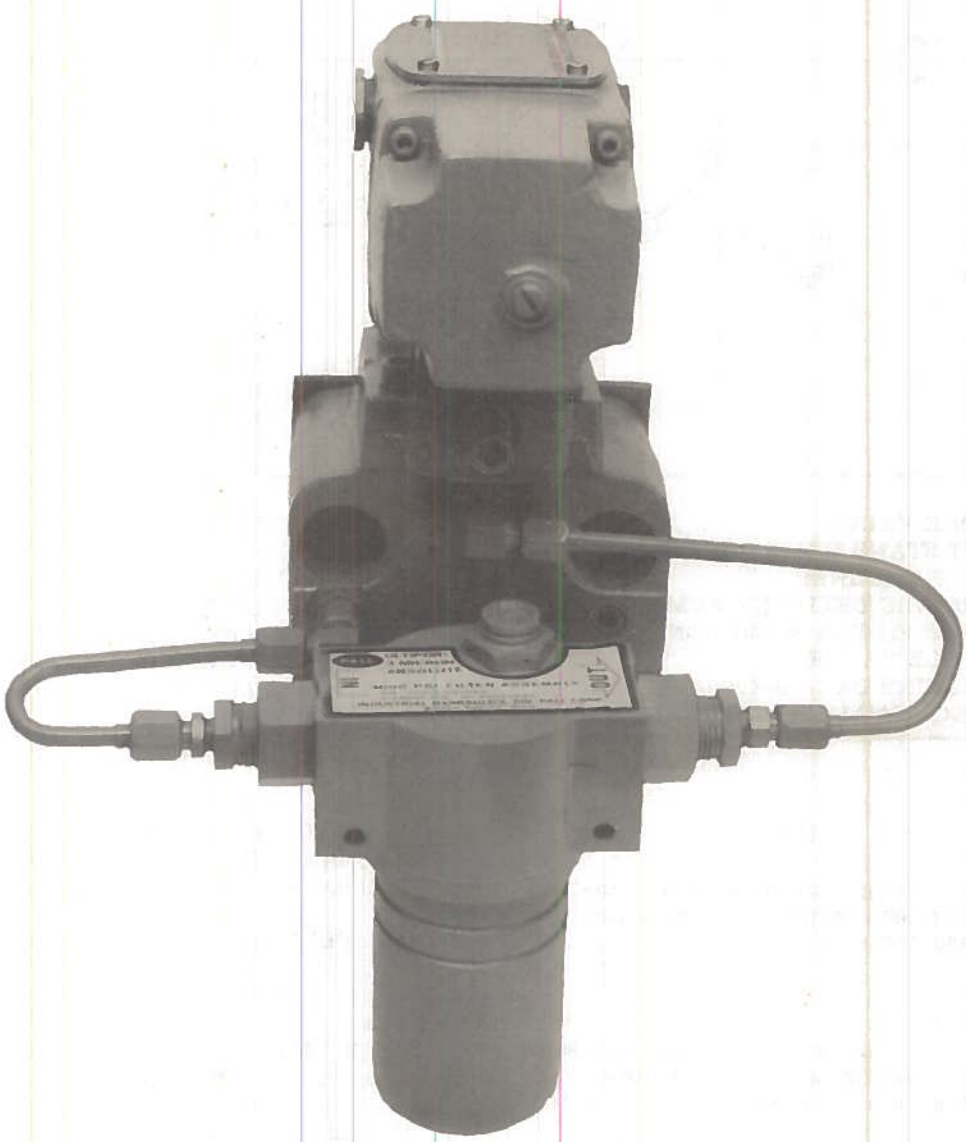


Figure 9. Filter connection for S-6 models.

Litho in U. S. A.

Service Parts Information

VICKERS®
A TRINOVA COMPANY

LEVER/CAM OPERATED MINIATURE 4-WAY DIRECTIONAL VALVE

DG17V-3-**(2)(L)-40 DG20V-3-**(2)(L)-40

* NOTE
COLLAR LOCATION SHOWN FOR "A" MODELS AT LEVER POSITION #3. IF LEVER POSITION #1 IS DESIRED, LOCATE COLLAR BEHIND SPRING TO OBTAIN "A2". SEE MODEL CODE.

⊖ ASSEMBLE PILOT SHAFTS FROM THE SIDE OF COVER AS SHOWN.

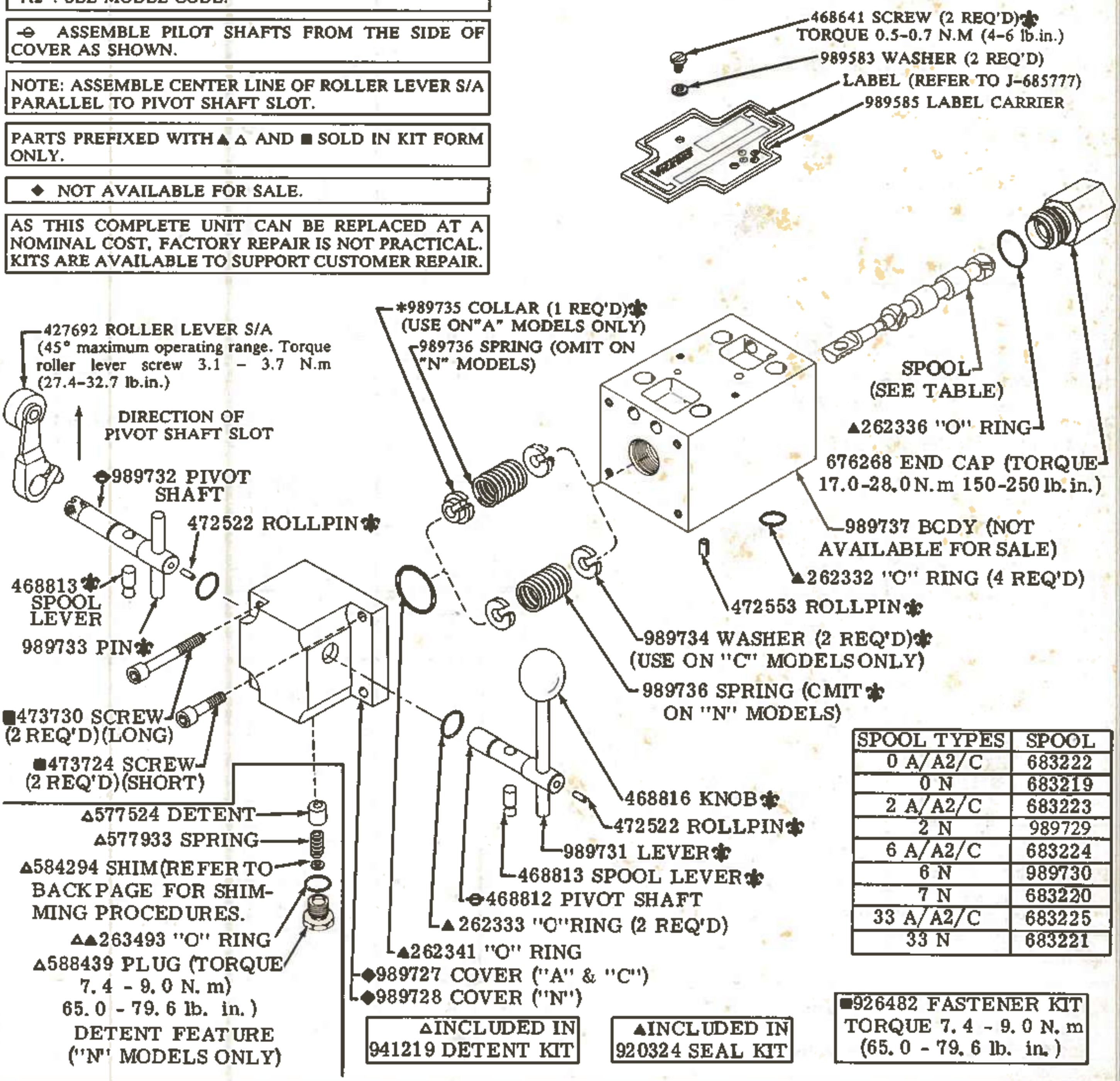
NOTE: ASSEMBLE CENTER LINE OF ROLLER LEVER S/A PARALLEL TO PIVOT SHAFT SLOT.

PARTS PREFIXED WITH ▲ △ AND ■ SOLD IN KIT FORM ONLY.

◆ NOT AVAILABLE FOR SALE.

AS THIS COMPLETE UNIT CAN BE REPLACED AT A NOMINAL COST, FACTORY REPAIR IS NOT PRACTICAL. KITS ARE AVAILABLE TO SUPPORT CUSTOMER REPAIR.

RIGHT HAND ASSEMBLY SHOWN. FOR LEFT HAND, ALL PARTS, EXCEPT BODY, ARE REVERSED. CHANGE THE NAMEPLATE LABEL TO REFLECT NEW MODEL CODE.



SPOOL TYPES	SPOOL
0 A/A2/C	683222
0 N	683219
2 A/A2/C	683223
2 N	989729
6 A/A2/C	683224
6 N	989730
7 N	683220
33 A/A2/C	683225
33 N	683221

△INCLUDED IN 941219 DETENT KIT

▲INCLUDED IN 920324 SEAL KIT

■926482 FASTENER KIT
TORQUE 7.4 - 9.0 N.m
(65.0 - 79.6 lb. in.)

MODEL CODE BREAKDOWN

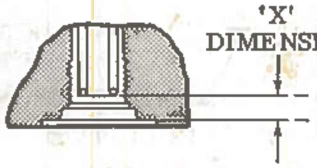
DGV-3-**(2)(L)-40**

- DG — DIRECTIONAL CONTROL VALVE
- — MANIFOLD OR SUBPLATE MOUNTED
- ** — MANUAL OPERATION
  - 17 - LEVER
  - 20 - ROLLER CAM
- V — RATED PRESSURE 350 BAR (5000 PSI)
- 3 — INTERFACE ISO-4401-03 NFPA-D01
- ** — SPOOL TYPES 0, 2, 6, 7, & 33
- (2) — SPOOL SPRING ARRANGEMENT
  - A - SPRING OFFSET TO NO. 3 POSITION
  - A2 - SPRING OFFSET TO NO. 1 POSITION
  - C - SPRING CENTERED
  - N - NO SPRING DETENTED
- (L) — L - LEFT HAND ASSEMBLY LEVER/ROLLER CAM LOCATED ON 'B' END. OMIT FOR STD. RIGHT HAND ASSEMBLY
- 40 — DESIGN

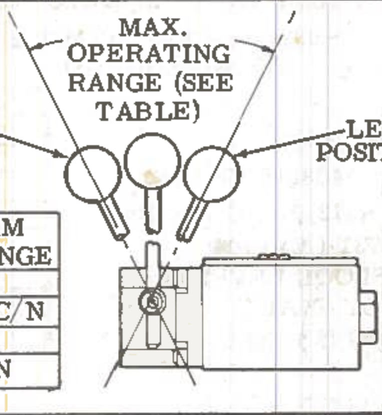
SHIMMING PROCEDURE

If replacement of the spool, detent, or spring is required, perform the following procedure to maintain a nominal detent force of 5kg, (11 lbs), on detented 'N' models only.

1. Turn valve over so porting is up.
2. Install detent and spring into valve cover. Make sure detent is located in a groove of the spool.
3. Measure 'X' distance between top of spring and spot face.
4. Use this measurement to determine shims from table.
5. Install shims and thread plug in place with a torque of 7.4-9.0 N.m (65.0-79.6 lb.in.)



'X' DIMENSION		SHIMS
mm	in.	REQ'D
1.39	.054	0
1.40 - 1.70	.055 - .067	1
1.71 - 2.00	.068 - .080	2
2.01 - 2.30	.081 - .093	3
2.31 - 2.60	.094 - .106	4



LEVER/ROLLER CAM MAX. OPERATING RANGE	
RANGE	MODEL
50°	DG17V-3-A/C/N
45°	DG20V-3-A
40°	DG20V-3-C/N

✤ AVAILABLE IN LOT KITS (25 PCS.)	
PART #	KIT #
468641	944012
468813	944016
468816	944021
472522	944022
472553	944008
989731	944030
989733	944017
989734	944020
989735	944018
989736	944023

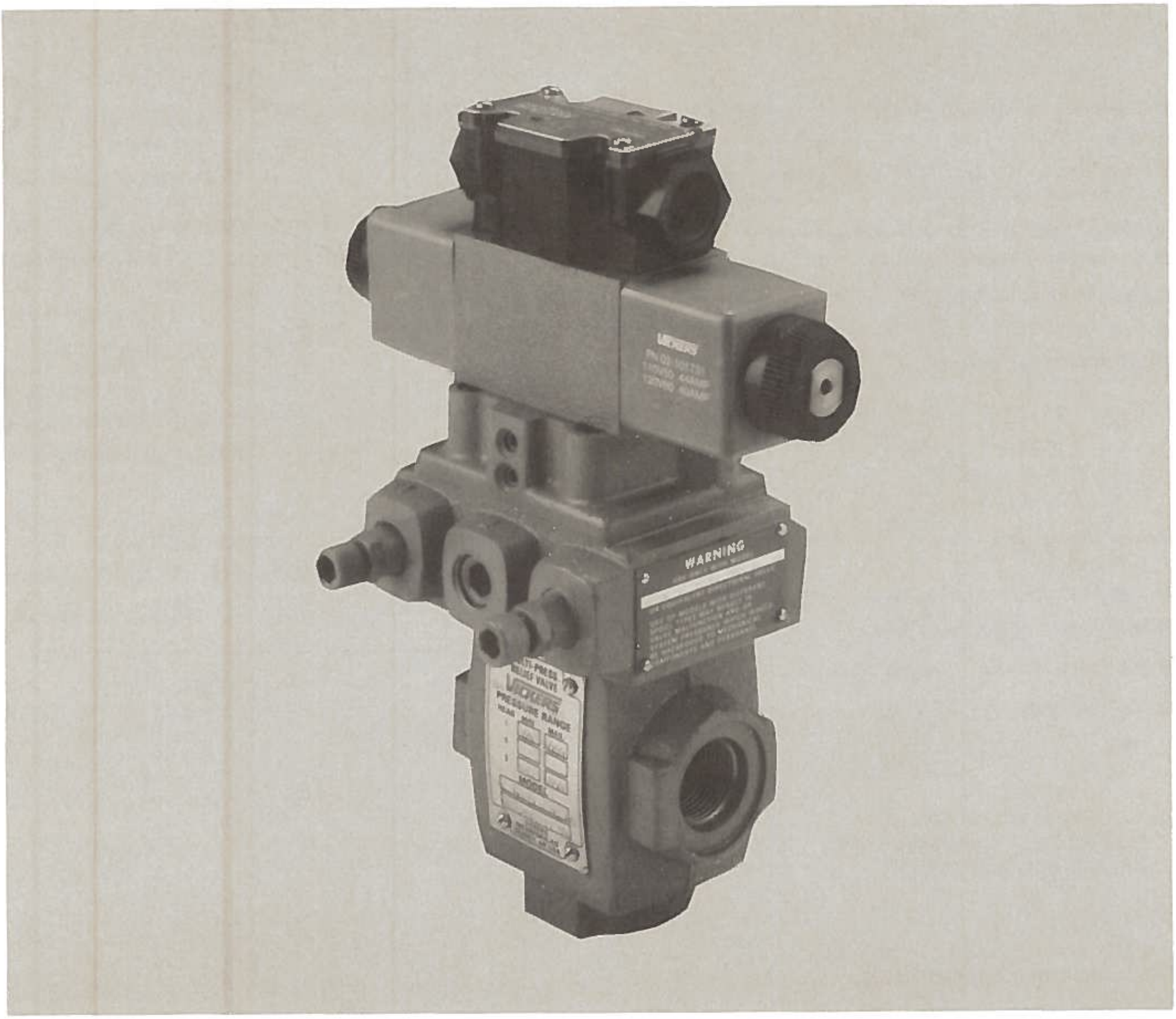
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

Service Data

Multi–Pressure Relief Valves

(F3)–C/G/S/T–06/10**(*)(V)–DG–8C(L)**–(V)M–(S*)*****(L)******–40/50

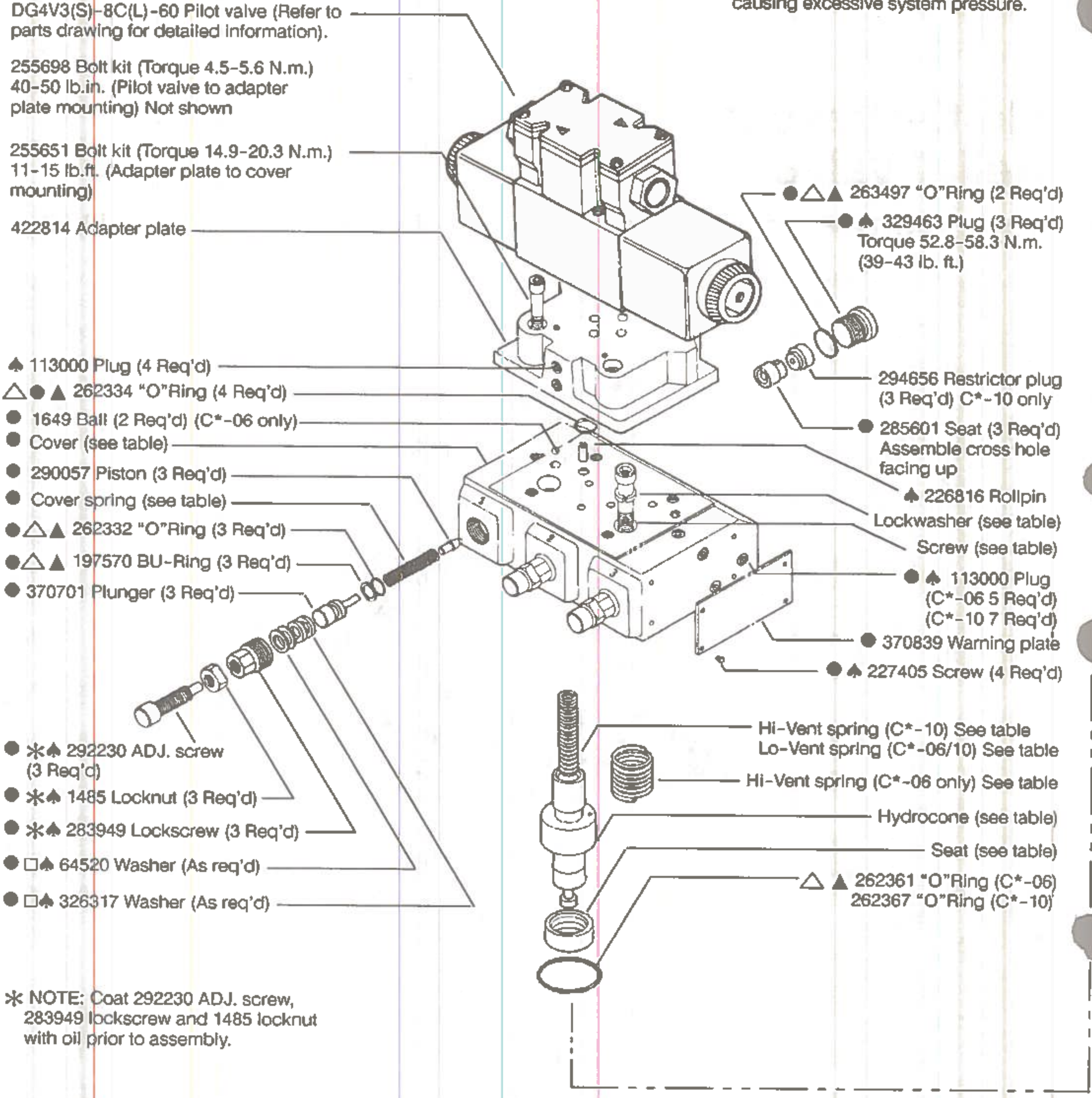


Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007–0302
U.S.A.

Released 07–01–91

NOTE: Lubricate all parts & seals with a thin coat of oil at assembly.

WARNING
Use only a DG4V3(S)-8C-60 directional valve as a pilot for this relief valve. Use of a different pilot can block relief valve, causing excessive system pressure.



✻ NOTE: Coat 292230 ADJ. screw, 283949 lockscrew and 1485 locknut with oil prior to assembly.

□ NOTE: These parts used at final test to obtain correct pressure range.

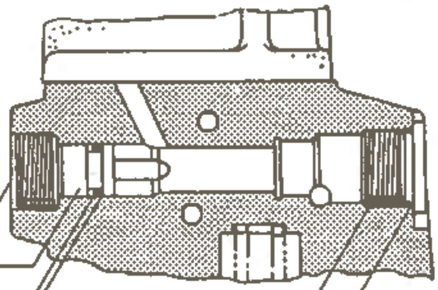
Model	Seat	Hydrocone	Lo-Vent spring	Hi-Vent spring	Cover
C*-06	343153	343154	2077	184458	370664
C*-10	283954	283952	291822	291821	370669

NOTE: Use either a Lo-Vent or Hi-Vent spring. Do not use both. (See model code)

NOTE:
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. OFP, OFR, and OFRS series filters are recommended.

Model	Screw (4 Req'd)	Torque lb. ft.	Torque N.m	Lock washer (4 Req'd)
C*-06	1036	11-15	14.9-20.3	68907
C*-10	1076	35-43	47.5-58.3	68909

Sectional "E" vent head 1, 2, or 3

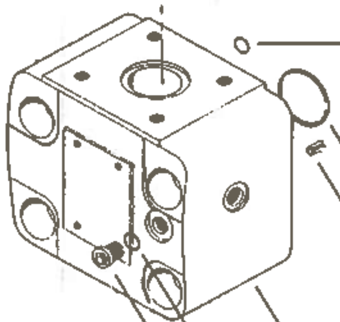


Cover kits for C*-06-*** are available for several spring arrangements	
Spring order in head 1 2 3	● Included in kit (-06 only)
-C B F-	● 942198
-C B C-	● 942202
-F F B-	● 942326

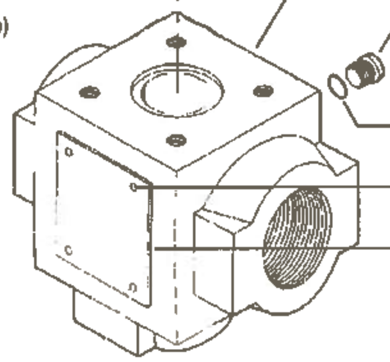
♠ Part	Kit
1485	944064
AX-36212	944053
1649	944067
64520	944068
113000	944055
160571	944069
218750	944070
226816	944071
227405	944074
292230	944072
326317	944073
329463	944041
343740	944038

Parts with ♠ available only in kits of 25.
Reference kit on parts order.

Model	Cover spring	Pressure range psi (bar)
C*-**-B	2280	125-1000 (8.5-70)
C*-**-C	583937	500-2000 (35-140)
C*-**-F	2281	1500-3000 (105-210)



Model	◆ Body -06	◆ Body -10
CG	580456	581703
CS	581701	580430
CT	590348	590300



▲ Included in -06 F3 seal kit 919684

△ Included in -10 F3 seal kit 919685

♠ Available only in kits of 25.

◆ Not available for sale

Model Code

(F3)–C* **–**(*)(V)–DG–**(L)**–(V)M–(S*)–*–**–*–*(L)–** *–***–**–EN**

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

1 Seals for mineral oil & fire resistant fluids

2 Relief valve connections

G – Subplate mounting
S – Straight threads
T – NPTF threads

3 Valve size

06 – 3/4"
10 – 1-1/4"

4 Pressure range

B – 125-1000 psi
C – 500-2000 psi
F – 1500-3000 psi
E – Vent

5 High vent

Blank – Omit for low vent models

6 Directional valve

7 Spool type & spring arrangement

8C – Spring centered, Tri-pressure

8 Left hand build
Omit for standard models

9 Manual override options (included in pilot valve model code)

Blank – Plain override solenoid ends only
H – Waterproof override solenoid ends only
H2 – Waterproof override both ends of single solenoid
M – Serviceable manual overrides in solenoid ends only
P2 – Plain override both ends of single solenoid
Y – Lockable manual overrides solenoid ends only
Z – No overrides in either end

10 Solenoid energization identity

Blank – Standard arrangement for ANSI B93.9 (energise solenoid A for flow P to A port)
V – Solenoid identification determined by position of solenoid. (Solenoid A at port A end and/or solenoid B at port B end.
(All 4 & 8 spools are always V code)

11 Flag symbol heading electrical options & features

12 Spool position monitoring switch (tank pressure rating 10 bar only)

S1 – Switch, normally open, U coils only
S2 – Switch, normally closed, U coils only
S3 – Switch, wired normally open, P*
S4 – Switch, wired normally closed, P*
S5 – Switch, free leads, FW & FJ only
Omit if not required

13 Coil type

U – ISO 4400
P – Plug in coil
F – Flying lead
SP1 – Single 6,3 series spade to IEC 760
SP2 – Dual 6,3 series spade to IEC 760

14 Electrical connections (F type coil only) omit if not required

T – Wired terminal block
PA – Instaplug male receptacle only
PB – Instaplug male & female receptacle
PA3 – Three pin connector & terminal block
PA5 – Five pin connector & terminal block

15 Housing (F type coils only)

W – 1/2 NPT thread wiring housing
J – 20 mm thread wiring housing

16 Electrical options

1 – ISO with fitted plug, U type coils only
7 – Surge damper, P type coils only
9 – Rectifier (fast type) P type coils only
12 – Rectifier (slow type) P type coils only

17 Solenoid indicator lights (F build only) To be used with T terminal block models.
(Omit if not required)

18 Coil indentification

19 Pilot valve code (tank pressure rating)

2 – 10 bar (145 psi) use with switch models S*
5 – 100 bar (1450 psi) for all other models

20 Pilot valve port orifices

21 Design

40 – DG4V3S-60
Standard pilot valve
50 – DG4V3-60
High performance pilot valve

22 Special modifications (omit if not required)

7 Thru 20 Included in pilot valve model code

VICKERS

Service Parts Information

DG17V-3-**(L)-60
Lever operated CETOP 3 directional control valve

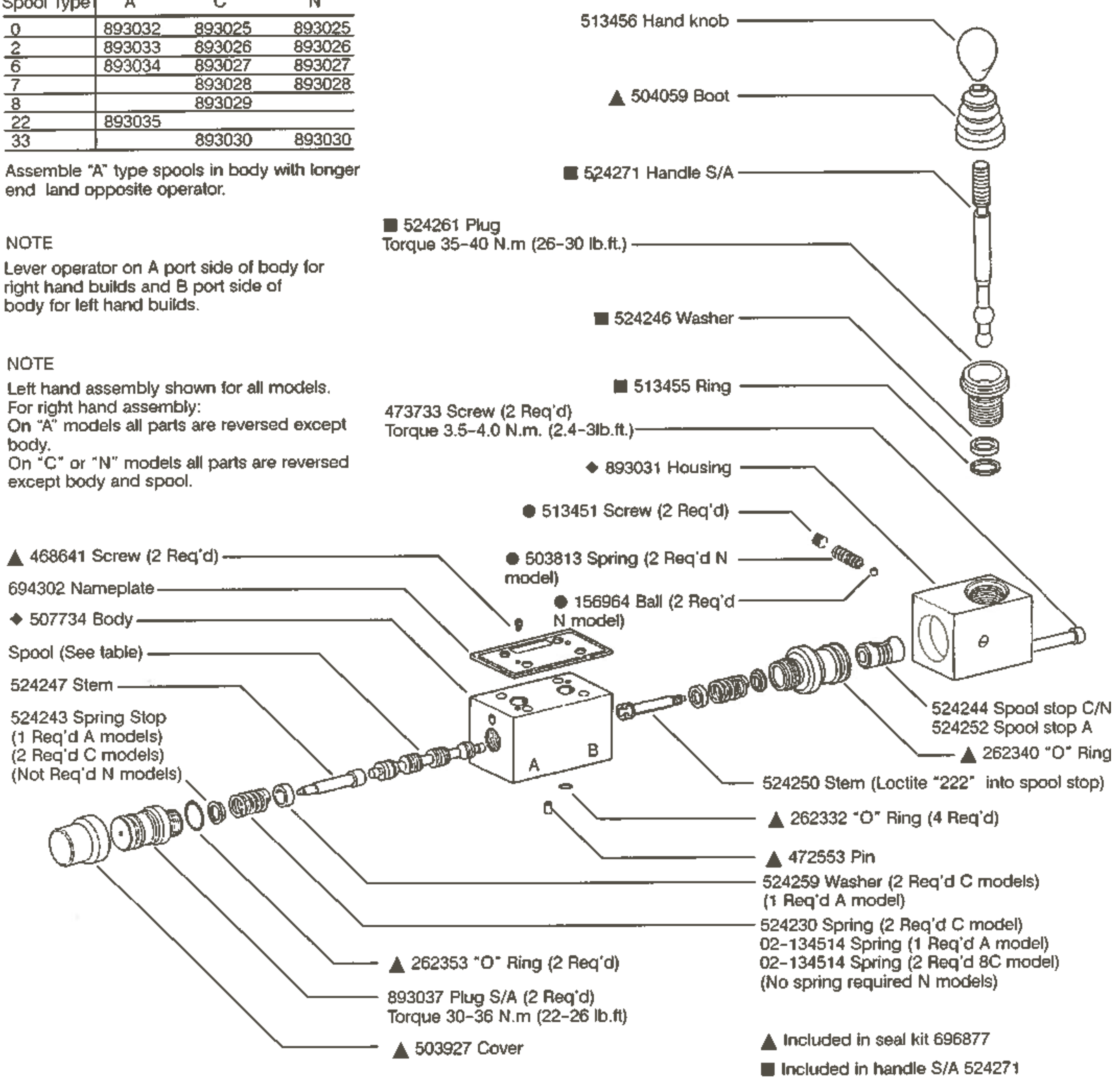
Spool Type	Model A	Model C	Model N
0	893032	893025	893025
2	893033	893026	893026
6	893034	893027	893027
7		893028	893028
8		893029	
22	893035		
33		893030	893030

Assemble "A" type spools in body with longer end land opposite operator.

NOTE
Lever operator on A port side of body for right hand builds and B port side of body for left hand builds.

NOTE
Left hand assembly shown for all models.
For right hand assembly:
On "A" models all parts are reversed except body.
On "C" or "N" models all parts are reversed except body and spool.

NOTE
Grease handle, socket & hole in stop prior to assembly.



▲ Included in seal kit 696877
■ Included in handle S/A 524271
● Included in Detent acces. kit 696891
◆ Not available for sale

Model Code

DG 17 V – 3 – * * (L) – 60

[1] [2] [3] [4] [5] [6] [7] [8]

[1] D – Directional control valve
G – Subplate mounting

[2] Lever operated

[3] Rated pressure

V – 350 bar (5075 psi)

[4] Interface

3 – ISO 4401-03 (CETOP 3 & NFPA D03)

[5] Spool type (see table)

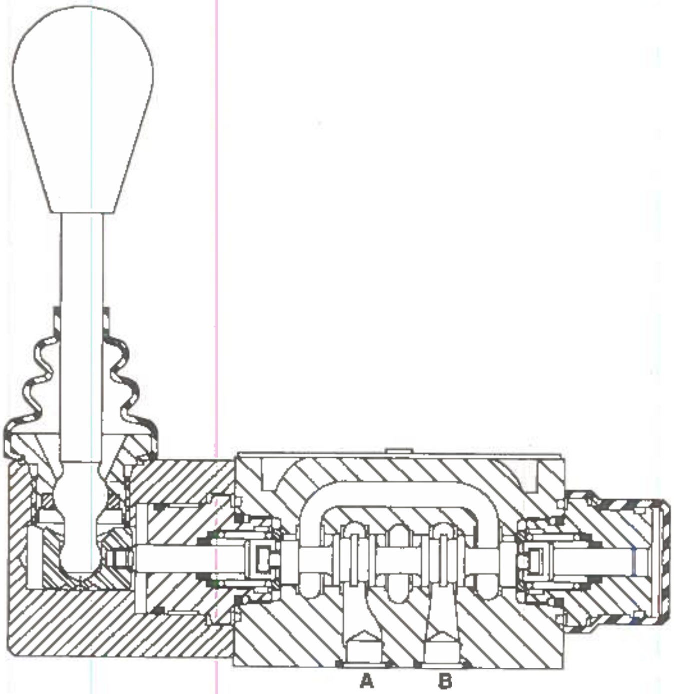
[6] Spool/Spring arrangement

A – Spring offset, to cylinder "A"
C – Spring centered
N – No spring detented

[7] Build type

L – Left hand build (lever on "B" port side of valve)
Omit – Right hand build (lever on "A" port side of valve)

[8] Design



Typical sectional view

VICKERS
A TRINOVA Company

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U.S.A.

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VICKERS

PRESSURE OPERATED CHECK VALVES

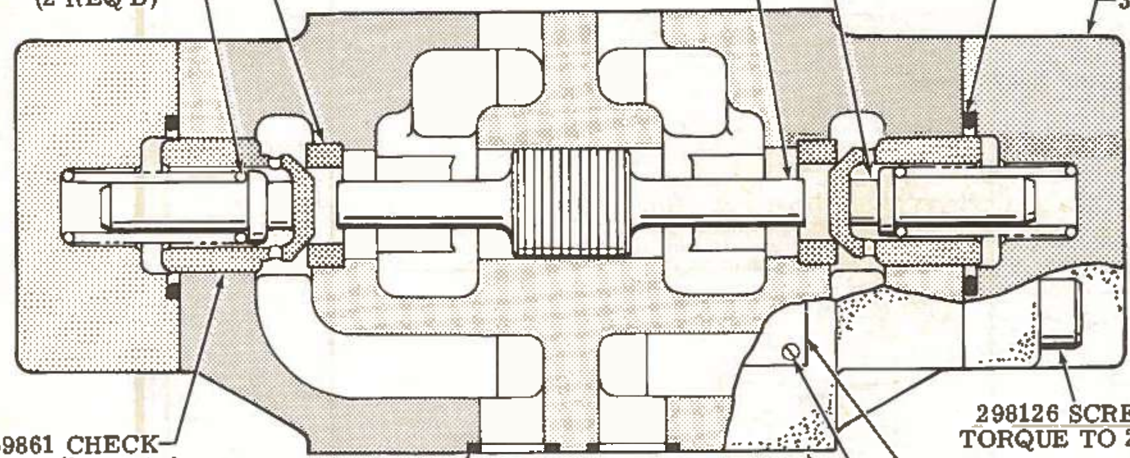
Service Parts Information

DGPC-01-A*B*-51
DGPC-06-A*B*-51

MODEL CODE BREAKDOWN

DG PC-01-A* B*-51

- DG — DIRECTIONAL CONTROL MANIFOLD OR SUBPLATE MOUNTED
- PC — PRESSURE OPERATED CHECK MODULE
- 01 — 1/8 INCH SIZE
- A — CHECK VALVE IN CYLINDER A PORT
- * — CYL. A PORT CHECK VALVE CRACKING PRESSURE (OMIT FOR 30 PSIG STANDARD)
- B — CHECK VALVE IN CYL. B PORT
- * — CYL. B PORT CHECK VALVE CRACKING PRESSURE (OMIT FOR 30 PSIG STANDARD)
- 51 — DESIGN



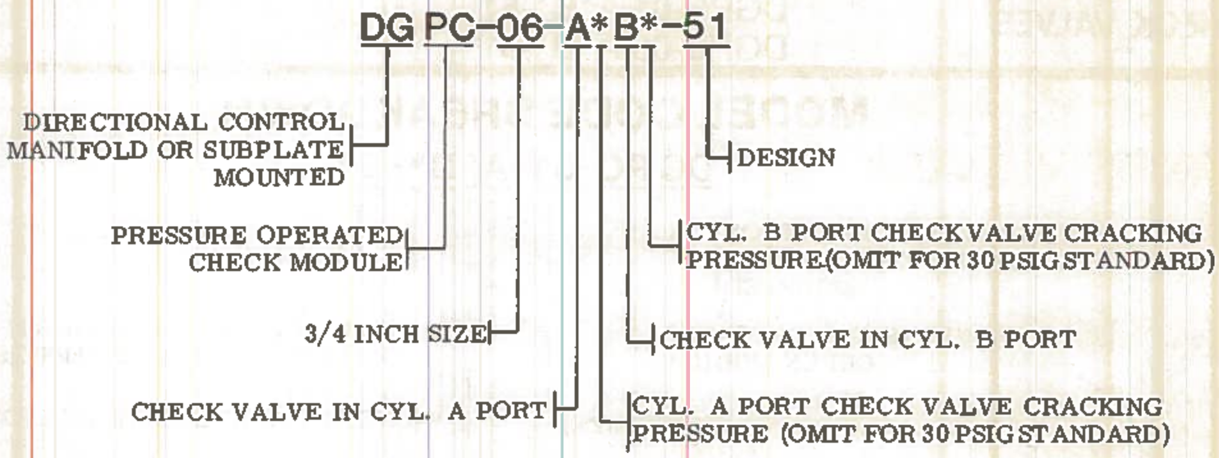
CAUTION
THIS VALVE CANNOT BE USED WITH PRESSURE CENTERED OR DG-18 AIR OPERATED VALVES.

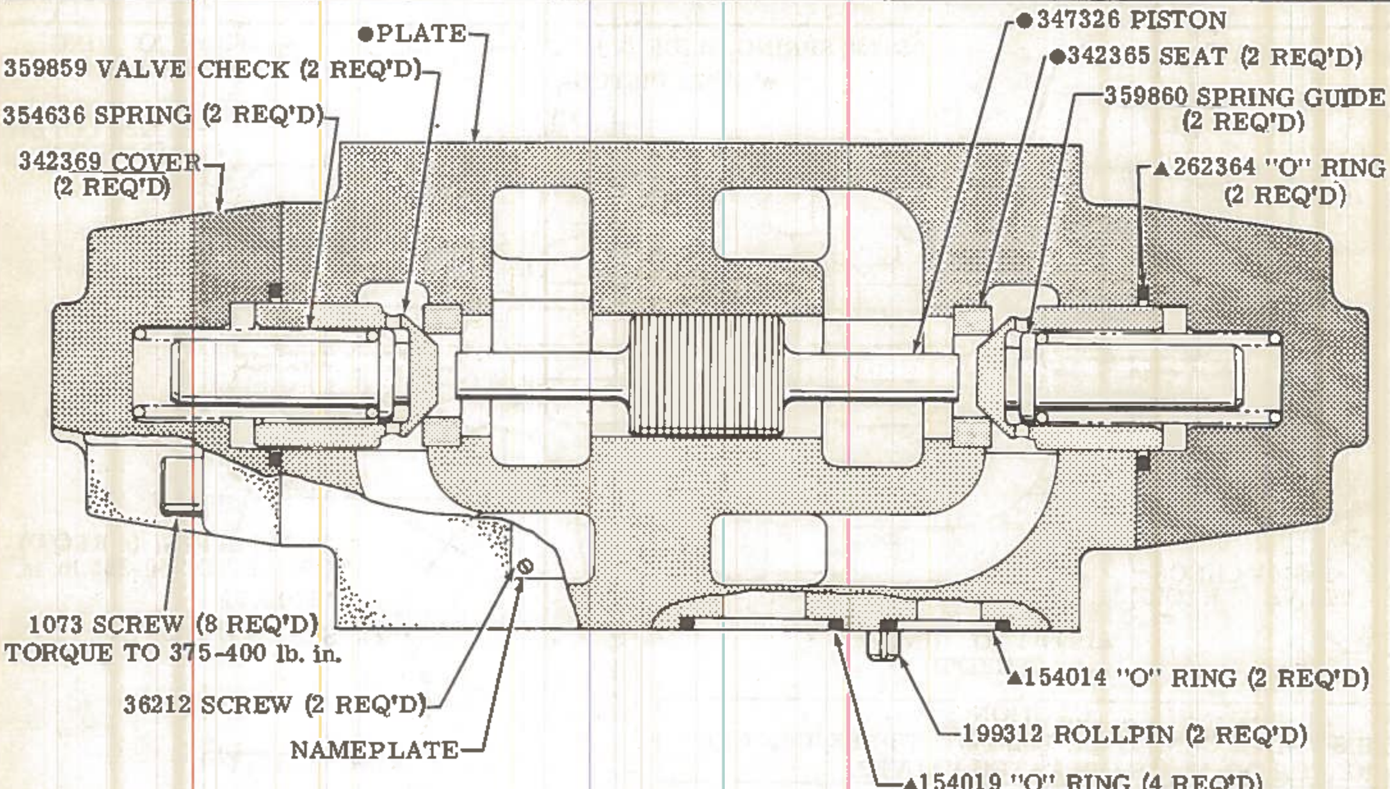
NOTE
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 112 lb. in. SUBPLATE INFORMATION IS TABULATED ON PARTS DRAWING I-3381-S.

●INCLUDED IN 347456 BODY S/A

▲INCLUDED IN F3 SEAL KIT 920215

MODEL CODE BREAKDOWN





CAUTION
THIS VALVE CANNOT BE USED WITH PRESSURE CENTERED OR DG-18 AIR OPERATED VALVES.

NOTE
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 700 lb. in. SUBPLATE INFORMATION IS TABULATED ON PARTS DRAWING I-3381-S.

▲INCLUDED IN F3 SEAL KIT 920216

●INCLUDED IN 349164 BODY S/A

Litho in U. S. A.

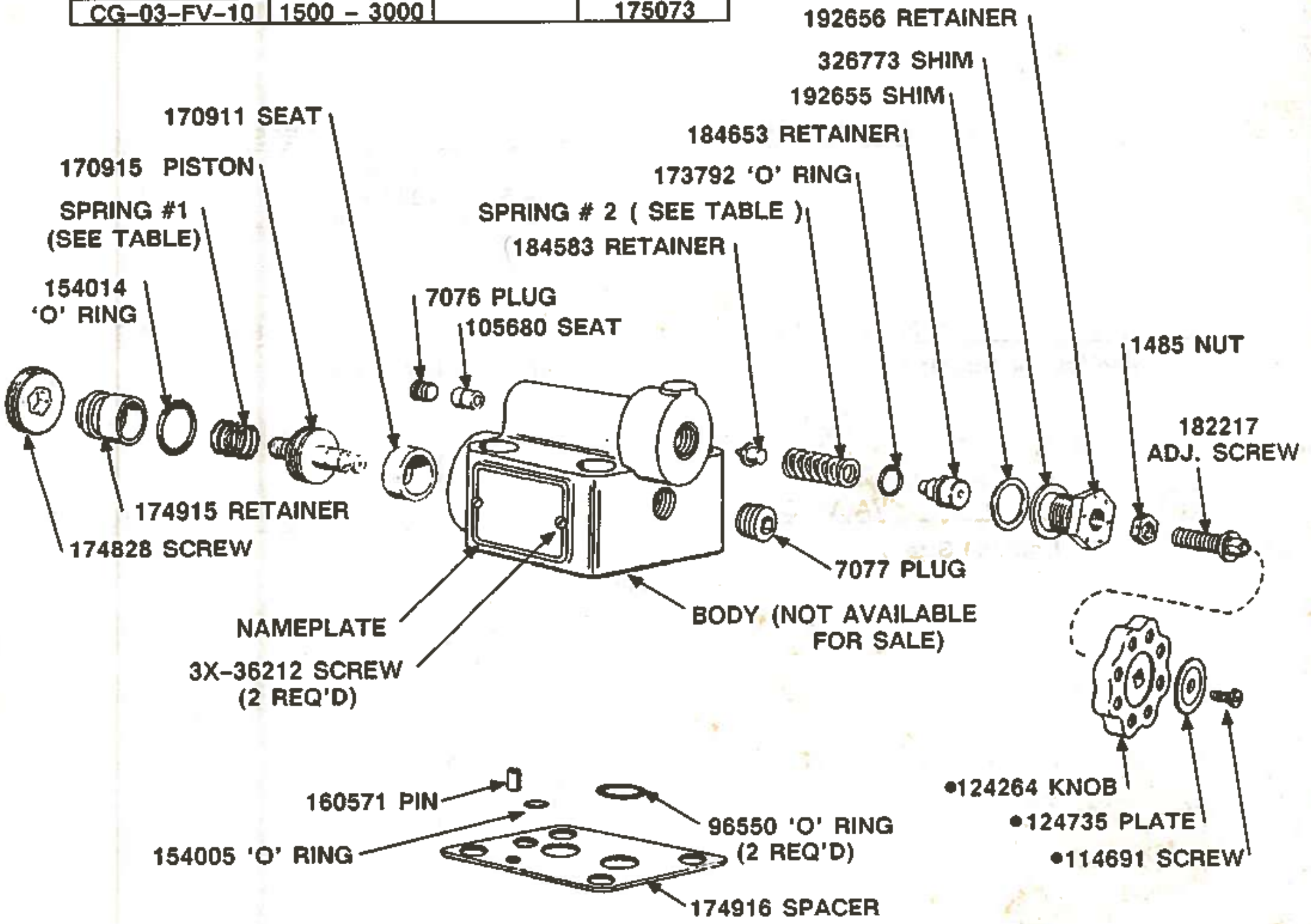
Service Parts Information

VICKERS
A TRINOVA COMPANY

HIGH PRESSURE
RELIEF VALVES

CG-03-**-10

MODEL	PRESSURE RANGE	SPRING #1	SPRING #2
CG-03-B-10	90 – 1000	175070	175071
CG-03-C-10	500 – 2000		175072
CG-03-F-10	1500 – 3000		175073
CG-03-BV-10	75 – 1000	184458	175071
CG-03-CV-10	500 – 2000		175072
CG-03-FV-10	1500 – 3000		175073



• Models with handwheel controls are available. Specify in model number by adding suffix -S81. Example: CG-03-*-10-S81

MODEL CODE BREAKDOWN

C	G	03	B	(V)	10
1	2	3	4	5	6

1 RELIEF VALVE

2 MOUNTING TYPE

G – Manifold or Subplate

3 VALVE SIZE

03 – 3/8'' Nominal Size

4 PRESSURE RANGE

B – 75 – 1000 PSI
C – 500 – 2000 PSI
F – 1500 – 3000 PSI

5 HIGH VENT SPRING

Omit if not required

6 DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

Litho in U.S.A.

Service Parts Information

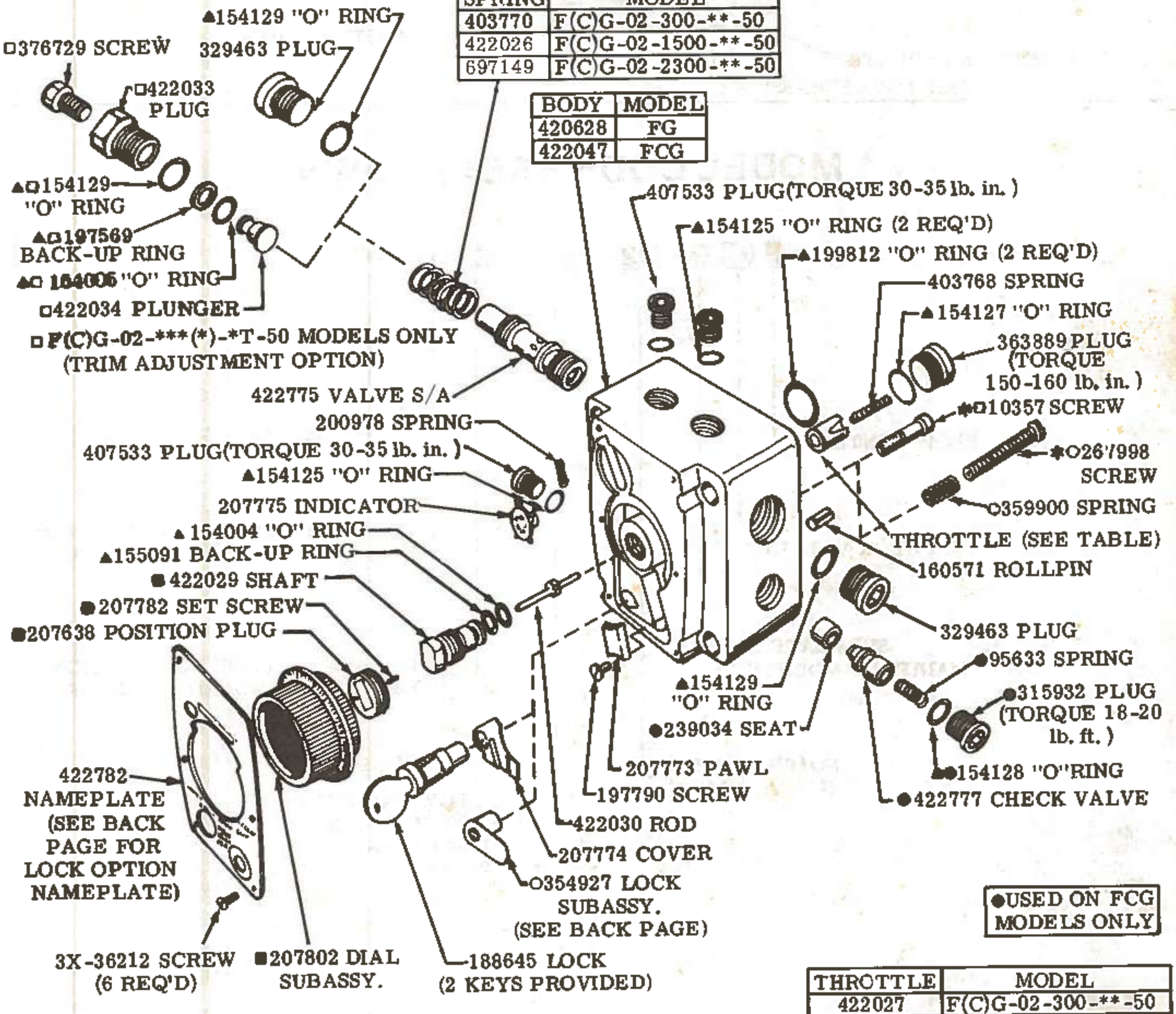
VICKERS
A TRINOVA COMPANY

FLOW CONTROL VALVES

F(C)G-02-300-**-50
F(C)G-02-1500-**-50
F(C)G-02-2300-**-50

SPRING	MODEL
403770	F(C)G-02-300-**-50
422026	F(C)G-02-1500-**-50
697149	F(C)G-02-2300-**-50

BODY	MODEL
420628	FG
422047	FCG



●USED ON FCG MODELS ONLY

THROTTLE	MODEL
422027	F(C)G-02-300-**-50
422028	F(C)G-02-1500-**-50
853593	F(C)G-02-2300-**-50

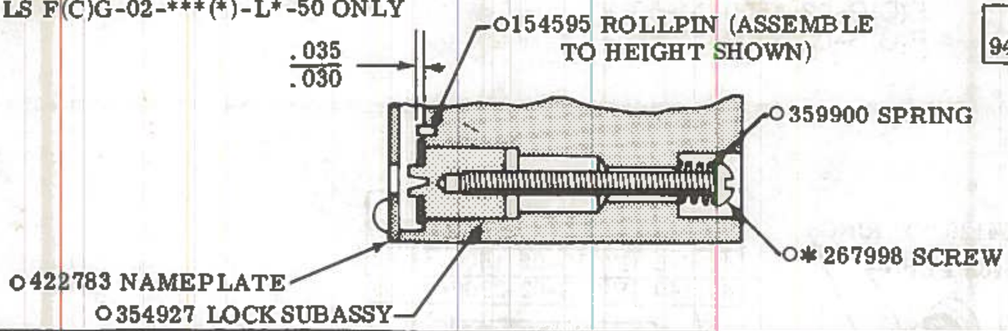
■WITH 422029 CONTROL SHAFT SCREWED FULLY IN, ADJUST 207638 POSITIONING PLUG IN 207802 DIAL SO THAT "O" ON DIAL LINES UP WITH POINTER ON NAMEPLATE WHEN DIAL IS ASSEMBLED ON SHAFT. LOCK SECURELY WITH 207782 SET SCREW.

▲INCLUDED IN 920037 SEAL KIT

F3 EQUIVALENT SEAL KIT 920103

* COAT THREADS WITH LOCTITE SEALANT. TIGHTEN TO LOCKING POSITION THEN BACK OFF 1/4 TURN.

TAMPERPROOF LOCK OPTION
MODELS F(C)G-02-***(*)-L*-50 ONLY



o INCLUDED IN 942085 LOCK KIT

MODEL CODE BREAKDOWN

F (C) G - 02 - * (*)-(L) (T) - 50**

- F — FLOW CONTROL
- (C) — CHECK VALVE
- G — SUBPLATE OR MANIFOLD MOUNTED
- 02 — NOMINAL SIZE (1/4 IN. NPT)
- *** (*) — FLOW CAPACITY
  - 300 CU. IN. /MIN.
  - 1500 CU. IN. /MIN.
  - 2300 CU. IN. /MIN.
- (L) — "L" TAMPERPROOF LOCK OPTION (OMIT FOR STANDARD KEY LOCK)
- (T) — "T" TRIM ADJUSTMENT OPTION (OMIT FOR STANDARD MODELS)
- 50 — DESIGN

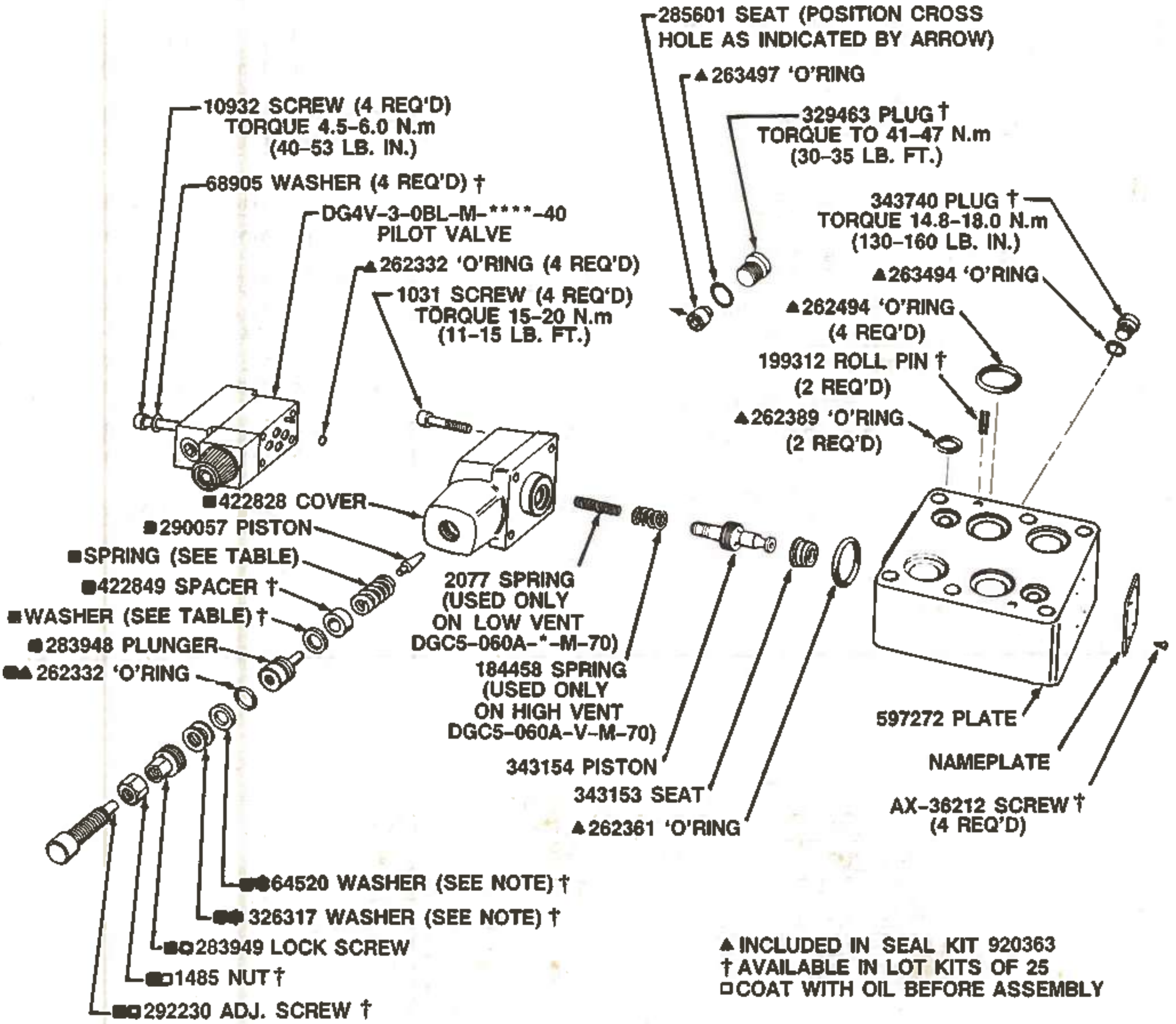
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

Service Parts Information

SOLENOID CONTROLLED RELIEF VALVE MODULE

VICKERS® A TRINOVA COMPANY

(F3)-DGC5-060A(P)-*(V)-M(P**)-**-*-70



▲ INCLUDED IN SEAL KIT 920363
† AVAILABLE IN LOT KITS OF 25
□ COAT WITH OIL BEFORE ASSEMBLY

MODEL	■ INCLUDED IN COVER S/A	SPRING	WASHER
DGC5-060A-B-*-M-70	926570	2280	OMIT
DGC5-060A-C-*-M-70	926571	583937	233110
DGC5-060A-F-*-M-70	926572	2281	OMIT

✱NOTE
USE AS REQUIRED TO OBTAIN PROPER ADJUSTMENT RANGE.

REFER TO I-3862-S FOR PILOT VALVE PARTS BREAKDOWN

MODEL CODE BREAKDOWN

(F3) – DGC5 06 0A (P) – * (V) – M (P**) – ** – * – 70

1 2 3 4 5 6 7 8 9 10 11 12

1 — Mineral Oil & Fire Resistant Seals

2 — Solenoid Controlled Relief Valve Module

3 — Valve Size (3/4 Inch)

4 — Pilot Valve Spool Type & Function

5 — Manual Override in Pilot Valve (Omit if not required)

6 — Pressure Range
B – 125-1000 PSI
C – 500-2000 PSI
F – 1500-3000 PSI

7 — High Vent Option (Omit if not required)

8 — Flag Symbol Heading for Electrical Features & Options at Pilot Valve

9 — Electrical Features (Refer to drawing I-3866-S)

10 — Electrical Connector Options
U – DIN 43650
W – 1/2'' NPT
WL – 1/2'' NPT with Solenoid Indicator Light

11 — Coil Voltage I.D. Letter Code (Refer to drawing I-3866-S)

12 — Design Number

† AVAILABLE IN LOT KITS OF 25			
ITEM	LOT KIT	ITEM	LOT KIT
1485 NUT	944064	292230 SCREW	944072
36212 SCREW	944053	233110 WASHER	944076
64520 WASHER	944068	326317 WASHER	944073
68905 WASHER	944077	329463 PLUG	944041
199312 PIN	944059	343740 PLUG	944038
		422849 SPACER	944075

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

VICKERS

SPRING CENTERED DIRECTIONAL VALVES

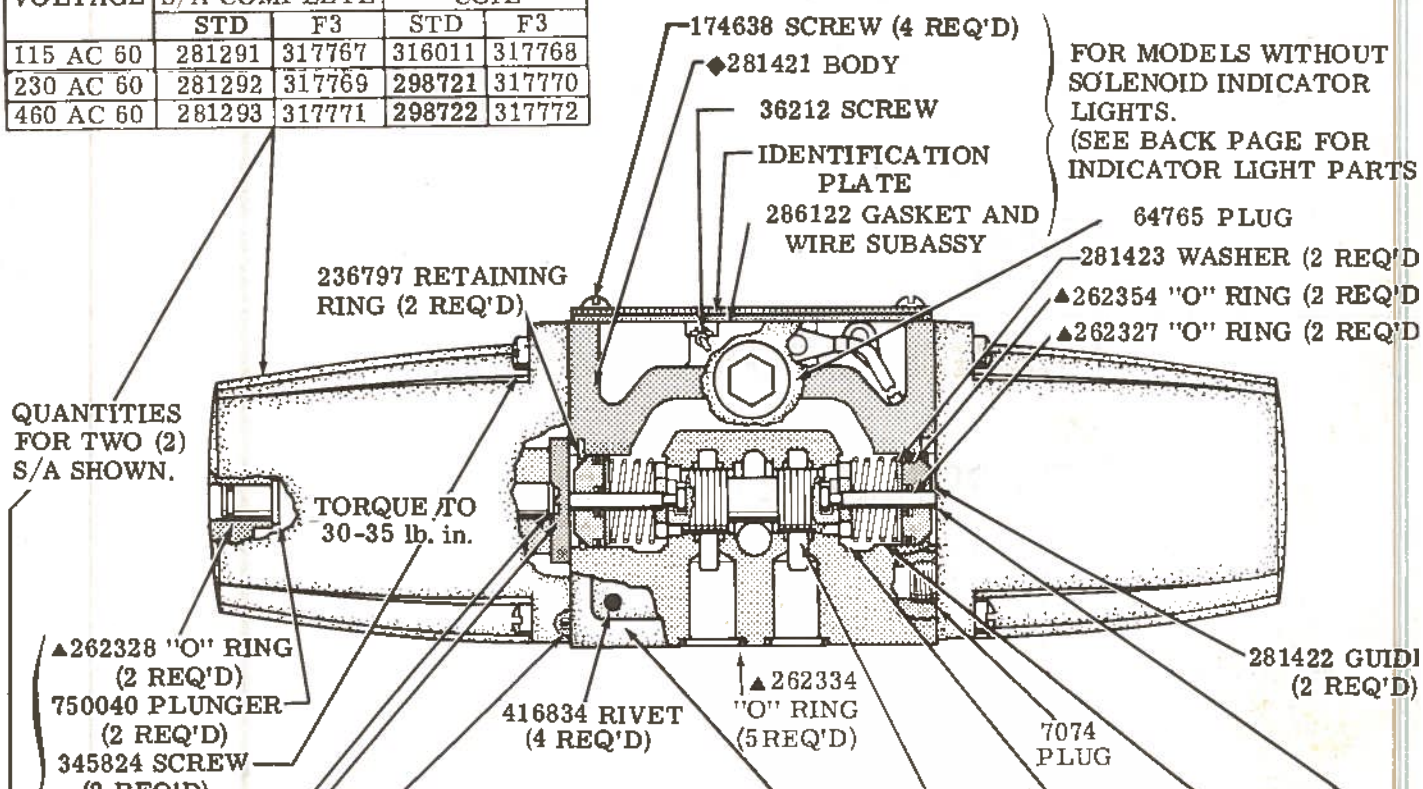
Service Parts Information

DG4S2-012C-(*)-50 DG4S4-01*(*)C-(*)-50

NOTE
FOR 50/60 CYCLE SOLENOIDS SEE BACK PAGE

FOR ADDITIONAL SOLENOID S/A'S SEE I-3544-S.

VOLTAGE	SOLENOID S/A (2 REQ'D)			
	S/A COMPLETE		COIL	
	STD	F3	STD	F3
115 AC 60	281291	317767	316011	317768
230 AC 60	281292	317769	298721	317770
460 AC 60	281293	317771	298722	317772



MODEL	DIAGRAM PLATE	SPOOL	WASHER (2 REQ'D)	SPRING (2 REQ'D)	PUSH PIN (2 REQ'D)
DG4S2-012C-(*)-50	290339	289186	211846	290072	213268
DG4S4-010C-(*)-50	290341	213230			
DG4S4-011C-(*)-50	290342	*276278			
DG4S4-012C-(*)-50	290343	213231			
DG4S4-013C-(*)-50	290344	*239903			
DG4S4-016C-(*)-50	290345	213232			
DG4S4-0168C-(*)-50	577480	213232			
DG4S4-017C-(*)-50	290346	236624			
DG4S4-0178C-(*)-50	577482	236624			
DG4S4-018C-(*)-50	290340	235637	□ 283637	217323	290264
DG4S4-0133C-(*)-50	577484	236615	211846	290072	213268

* ASSEMBLE RELIEVED LAND OF TYPE 1 & NARROW LAND OF TYPE 3 SPOOLS TOWARD "A" PORT.
□ ASSEMBLE ON SPOOL WITH SHARP BREAK EDGE TOWARD SPRING.

▲INCLUDED IN 919214 SEAL KIT

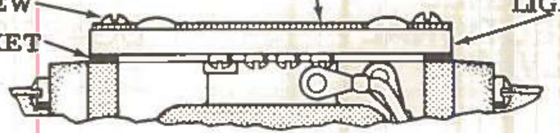
◆NOT AVAILABLE FOR SALE

Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48084

SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615

NOTE
REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURE.

FOR MODELS WITH SOLENOID INDICATOR LIGHTS



50/60 HERTZ SOLENOIDS		
MODEL	SOLENOID S/A (2 REQ'D)	COIL
DG*S4-****-115AC-50/60-5*	751137	751057
F3-DG*S4-****-115AC-50/60-5*	751407	751406

LEAD WIRE IDENTIFICATION
RED LEAD - COMMON
YELLOW LEAD - 60 Hz
BLUE LEAD - 50 Hz

CAUTION
FOR 50 CYCLE OPERATION USE <u>RED</u> AND <u>BLUE</u> LEADS
FOR 60 CYCLE OPERATION USE <u>RED</u> AND <u>YELLOW</u> LEADS
<u>DO NOT</u> USE BLUE AND YELLOW LEADS TOGETHER

MODEL CODE BREAKDOWN

(F3)-DG4S*(L)-01*C-(*AC**)-50**

- (F3) — MULTI-FLUID CAPABILITY (VITON SEALS)
- D — DIRECTIONAL VALVE
- G — GASKET MOUNTED
- 4 — SOLENOID OPERATED
- S — SLIDING SPOOL
- * — FLOW DIRECTIONS: 2-2 WAY, 4-4 WAY
- (L) — L - SOLENOID INDICATOR LIGHT; OMITTED-NONE
- 01 — SERIES
- * — SPOOL TYPE
- C — SPRING CENTERED
- (***AC**) — SOLENOID VOLTAGE AND FREQUENCY; OMITTED-115VAC60 STANDARD
- 50 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

VICKERS

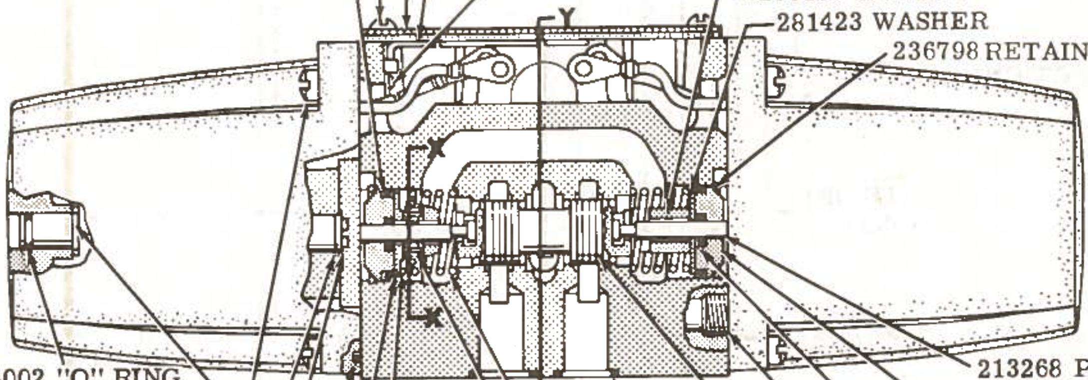
NO-SPRING DETENTED SOLENOID CONTROLLED DIRECTIONAL VALVES

Service Parts Information

DG4S*(L)-01*N-(***AC)*-51

VOLTAGE	SOLENOID S/A	COIL S/A	SOLENOID S/A F3	COIL S/A F3
115 AC 60	281291	316011	317767	317768
230 AC 60	281292	298721	317769	317770
460 AC 60	281293	298722	317771	317772

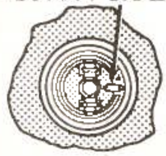
FOR ADDITIONAL SOLENOID S/A SEE I-3544-S



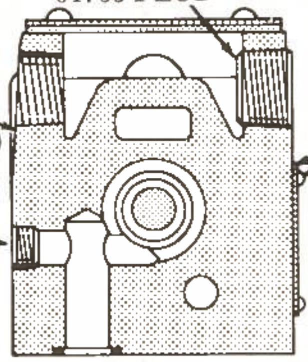
MODEL	DIAGRAM PLATE
DG4S2-	577485
DG4S4-	577486

MODEL	SPOOL
DG4S2(L)-012N-51	289186
DG4S4(L)-010N-51	213230
DG4S4(L)-012N-51	213231
DG4S4(L)-016N-51	213232
DG4S4(L)-017N-51	236624
DG4S4(L)-0133N-51	236615

✱TORQUE TO 30 - 35 lb. in.



SECTION **X-X**



SECTION **Y-Y**

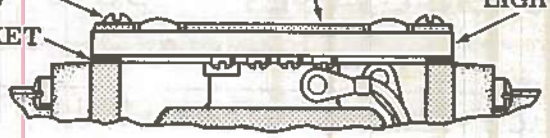
■ INCLUDED IN 942132, 51 DESIGN DETENT S A

▲INCLUDED IN F3 SEAL KIT 919214

Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48084

SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615

FOR MODELS WITH SOLENOID INDICATOR LIGHTS



MODEL CODE BREAKDOWN

DG4S * (L) -01 * N-(*AC**)- 51**

- DIRECTIONAL VALVE
- SUBPLATE OR MANIFOLD MOUNTED
- SOLENOID OPERATED
- SLIDING SPOOL
- FLOW DIRECTIONS
  - 2-2 WAY
  - 4-4 WAY
- L-SOLENOID INDICATOR LIGHTS
  - OMITTED-NONE
- SERIES 10
- SPOOL TYPE
- NO-SPRING DETENTED
- SOLENOID VOLTAGE AND FREQUENCY
  - OMITTED-115VAC60 STANDARD
- DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

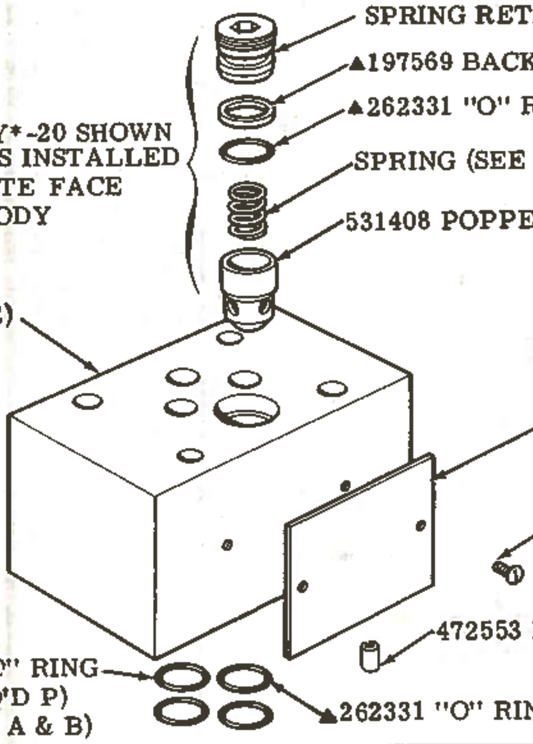
Service Parts Information

VICKERS®
A TRINOVA COMPANY

DIRECT CHECK VALVE MODULE

DGMDC-3-*X*-20

DGMDC-3-*Y*-20



✽AVAILABLE ONLY IN KITS OF 25 EACH

MODEL	BODY S/A	SPRING RETAINER
DGMDC-3-AY*-20	531692	531492
DGMDC-3-BY*-20	531693	531492
DGMDC-3-PY*-20	531409	531406

MODEL	SPRING
DGMDC-3-*YL-20	531404
DGMDC-3-*YR-20	531405

NOTE: THIS UNIT IS OF METRIC DESIGN

▲INCLUDED IN F3 SEAL KIT 920107

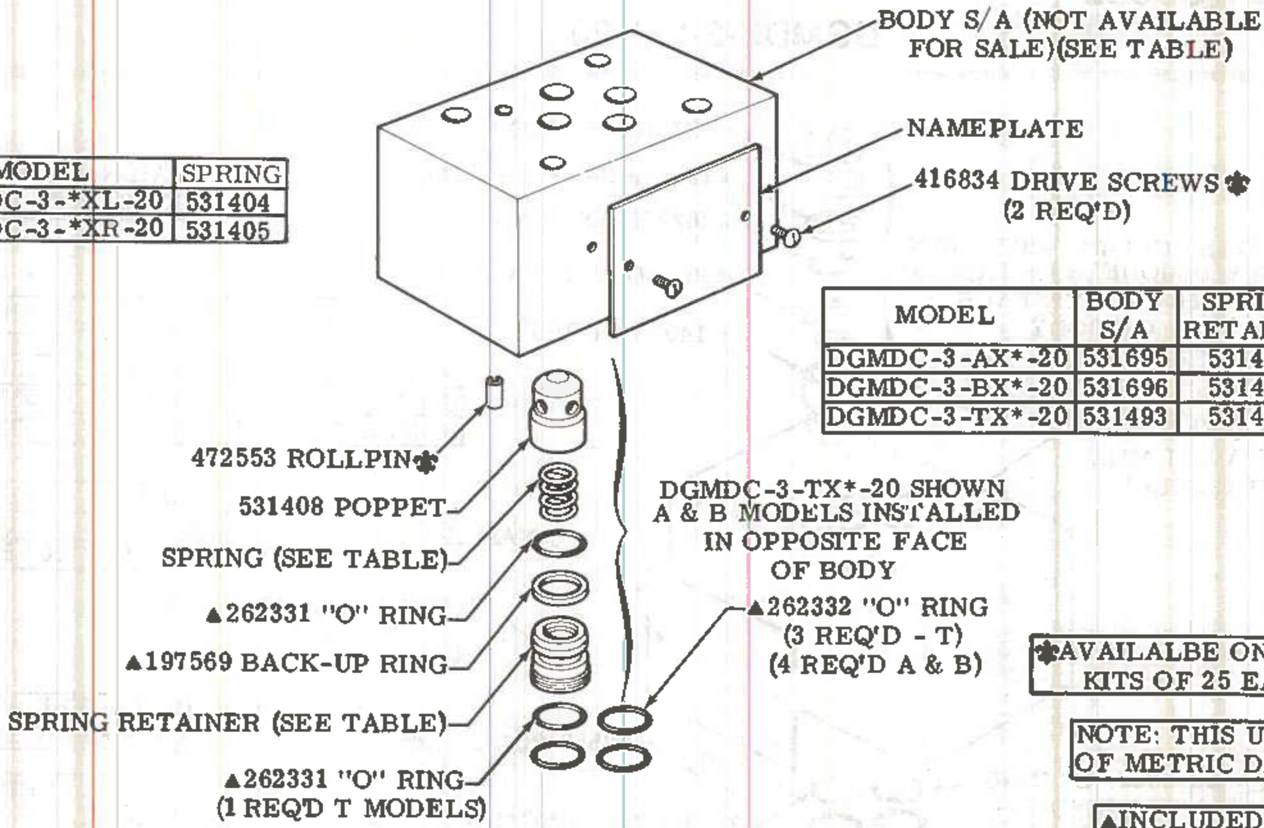
MODEL CODE BREAKDOWN

DGM DC - 3 - * Y * - 20

- DGM — DIRECTIONAL GASKET MOUNTED MODULE
- DC — DIRECT CHECK
- 3 — NFPA-D01 INTERFACE (ISO-4401-3)
- * — PORT OPERATED UPON
  - A - A PORT
  - B - B PORT
  - P - PRESSURE PORT
- Y — DIRECTION OF CHECK FUNCTION
  - Y - FREE FLOW TO LOAD
- * — CRACKING PRESSURE
  - L - 0.35 bar (5 PSI)
  - R - 3.50 bar (50 PSI)
- 20 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

MODEL	SPRING
DGMDC-3-*XL-20	531404
DGMDC-3-*XR-20	531405



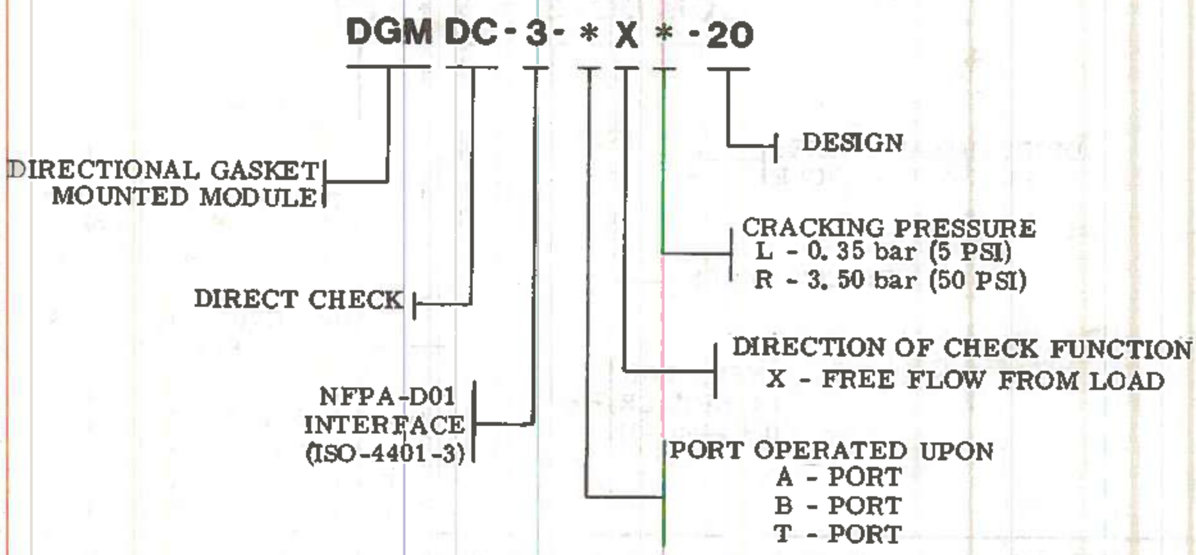
MODEL	BODY S/A	SPRING RETAINER
DGMDC-3-AX*-20	531695	531406
DGMDC-3-BX*-20	531696	531406
DGMDC-3-TX*-20	531493	531492

✽AVAILALBE ONLY IN KITS OF 25 EACH

NOTE: THIS UNIT IS OF METRIC DESIGN

▲INCLUDED IN F3 SEAL KIT 920107

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

VICKERS

SPRING OFFSET DIRECTIONAL VALVES

Service Parts Information

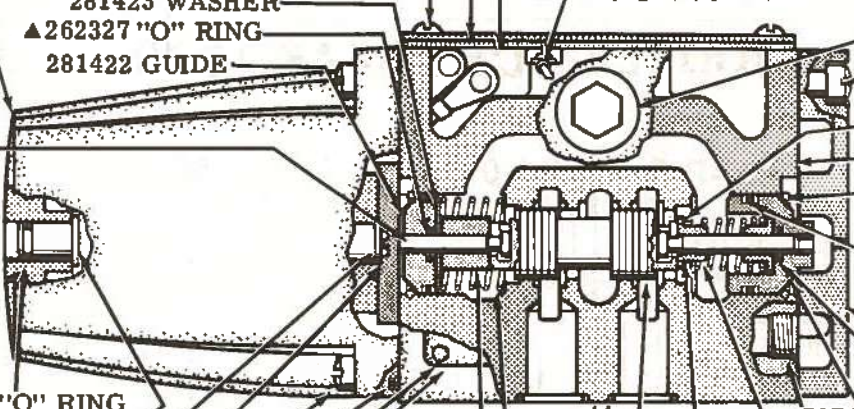
DG4S2(L)-012A-(***AC**)-50
DG4S4(L)-01*A-(***AC**)-50

RIGHT HAND ASSEMBLY SHOWN. IN LEFT HAND ASSEMBLY ALL PARTS OF VALVE EXCEPT BODY ARE REVERSED. EXAMPLE OF L.H. MODEL: DG4S4(L)-012A-50-LH

NOTE
FOR 50/60 CYCLE SOLENOIDS SEE BACK PAGE

VOLTAGE	SOLENOID S/A			
	S/A COMPLETE		COIL	
	STD	F3	STD	F3
115AC60	281291	317767	316011	317768
230AC60	281292	317769	298721	317770
460AC60	281293	317771	298722	317772

FOR ADDITIONAL SOLENOID S/A'S SEE I-3544-S.



MODEL	SPOOL	PUSH PIN	LIMITER (2 REQ'D)	GUIDE	"O" RING
DG4S2(L)-012A-(*)-50	220344	———	———	281424	———
DG4S4(L)-010A-(*)-50	213230	220234	294226	284931	262327 ▲
DG4S4(L)-012A-(*)-50	213231				
DG4S4(L)-016A-(*)-50	213232				

MODEL	DIAGRAM PLATE	
	RH	LH
DG4S2(L)-	290347	577488
DG4S4(L)-	290348	577490

▲INCLUDED IN F3 SEAL KIT 919214

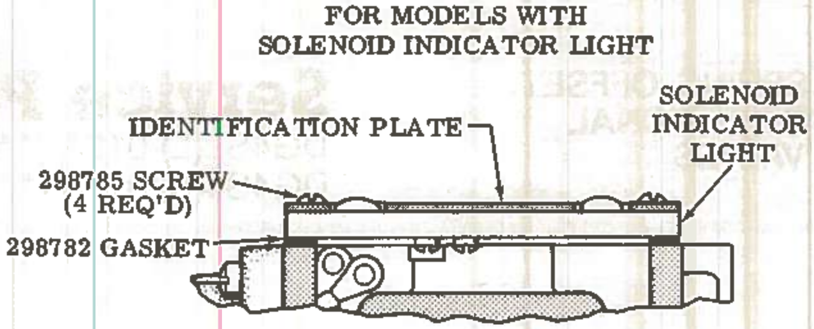
◆NOT AVAILABLE FOR SALE

✱TORQUE TO 30 - 35 lb. in.

Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48084

SOLENOID INDICATOR LIGHT KITS (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615

NOTE
REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURE.



50/60 HERTZ SOLENOIDS		
MODEL	SOLENOID S/A	COIL
DG*S4-****-115AC-50/60-50	751137	751057
F3-DG*S4-****-115AC-50/60-50	751407	751406

LEAD WIRE IDENTIFICATION
RED LEAD - COMMON
YELLOW LEAD - 60 Hz.
BLUE LEAD - 50 Hz.

CAUTION
FOR 50 CYCLE OPERATION USE RED AND BLUE LEADS
FOR 60 CYCLE OPERATION USE RED AND YELLOW LEADS
DO NOT USE BLUE AND YELLOW LEADS TOGETHER

MODEL CODE BREAKDOWN

(F3)-D G 4 S*(L)-01*A-(*AC**)-50**

- (F3) — MULTI-FLUID CAPABILITY (VITON SEALS)
- D — DIRECTIONAL VALVES
- G — SUBPLATE OR MANIFOLD MOUNTED
- 4 — SOLENOID OPERATED
- S — SLIDING SPOOL
- * — FLOW DIRECTIONS
  2-2 WAY
  4-4 WAY
- (L) — L - SOLENOID INDICATOR LIGHT
  OMITTED - NONE
- 01 — SERIES
- * — SPOOL TYPE
- A — SPRING OFFSET
- (***AC**) — SOLENOID VOLTAGE AND FREQUENCY
  OMITTED - 115VAC60 STANDARD
- 50 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

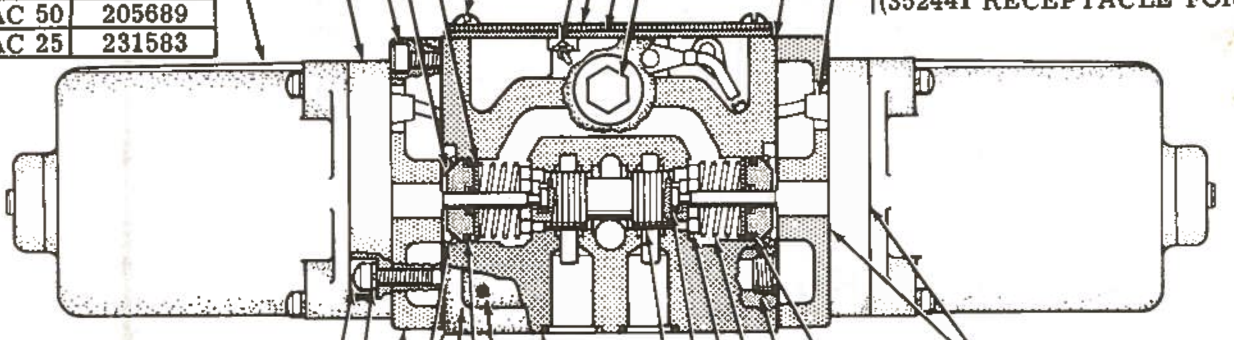
VICKERS

SPRING CENTERED SOLENOID CONTROLLED DIRECTIONAL VALVES

Service Parts Information

DG4S4(L)-01*C-H-(***AC***)-50

VOLTAGE	SOLENOID S/A
24 AC 60	251505
110 AC 60	232960
115 AC 60	195053
120 AC 60	240996
215 AC 60	323163
230 AC 60	195054
115 AC 50	205687
120 AC 50	290899
220 AC 50	248640
230 AC 50	205688
240 AC 50	279926
415 AC 50	237544
460 AC 50	205689
110 AC 25	231583

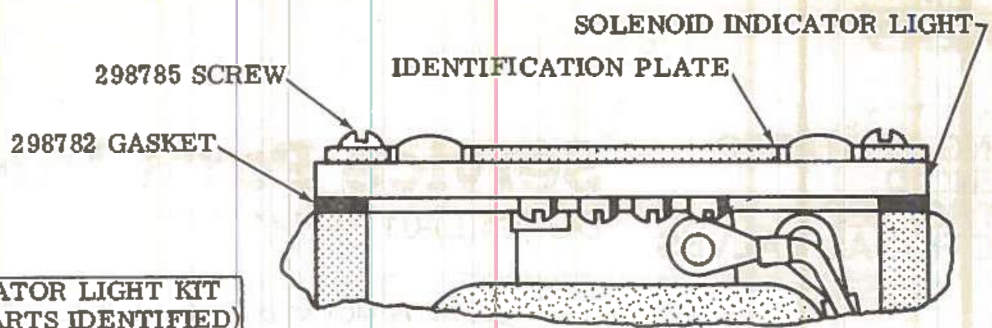


◆NOT AVAILABLE FOR SALE

▲INCLUDED IN F3 919359 SEAL KIT

✱ASSEMBLE ON SPOOL WITH SHARP BREAK EDGE OF WASHER TOWARD SPRING

MODEL	DIAGRAM PLATE	SPOOL	WASHER (2 REQ'D)	SPRING (2 REQ'D)	PUSH PIN (2 REQ'D)
DG4S4-010C-H-(*)-50	290341	213230	211846	290072	289340
DG4S4-012C-H-(*)-50	290343	213231	211846	290072	289340
DG4S4-013C-H-(*)-50	290344	239903	211846	290072	289340
DG4S4-016C-H-(*)-50	290345	213232	211846	290072	289340
DG4S4-017C-H-(*)-50	290346	236624	211846	290072	289340
DG4S4-018C-H-(*)-50	290340	235637	✱283637	217323	290320
DG4S4-0133C-H-(*)-50	577484	236615	211846	290072	289340



SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615

NOTE
REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURE.

MODEL CODE BREAKDOWN

F3-DG4S*(L)-01*C-H-(*AC**)-50**

- F3 — MULTI-FLUID CAPABILITY (VITON SEALS)
- D — DIRECTIONAL VALVE
- G — SUBPLATE MOUNTED
- 4 — SOLENOID OPERATED
- S — SLIDING SPOOL
- * — FLOW DIRECTIONS
  - 2 - 2 WAY
  - 4 - 4 WAY
- (L) — L - SOLENOID INDICATOR LIGHT; OMITTED - NONE
- 01 — SERIES
- * — SPOOL TYPE
- C — SPRING CENTERED
- H — OIL IMMERSED SOLENOID
- (***AC**) — SOLENOID VOLTAGE AND FREQUENCY; OMITTED - 115 VAC 60 STANDARD
- 50 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

VICKERS

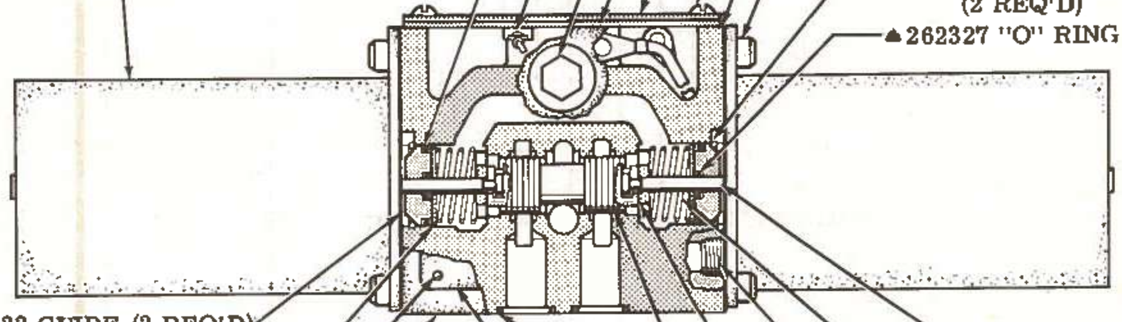
SPRING CENTERED SOLENOID CONTROLLED DIRECTIONAL VALVES

Service Parts Information

DG4S4-01*C-*DC-50

VOLTAGE	SOLENOID S/A (2 REQ'D)	COIL S/A (2 REQ'D)	SOLENOID S/A F3 (2 REQ'D)	COIL S/A F3 (2 REQ'D)
12 DC	290839	291583	751283	751284
24 DC	290840	291584	393091	393090

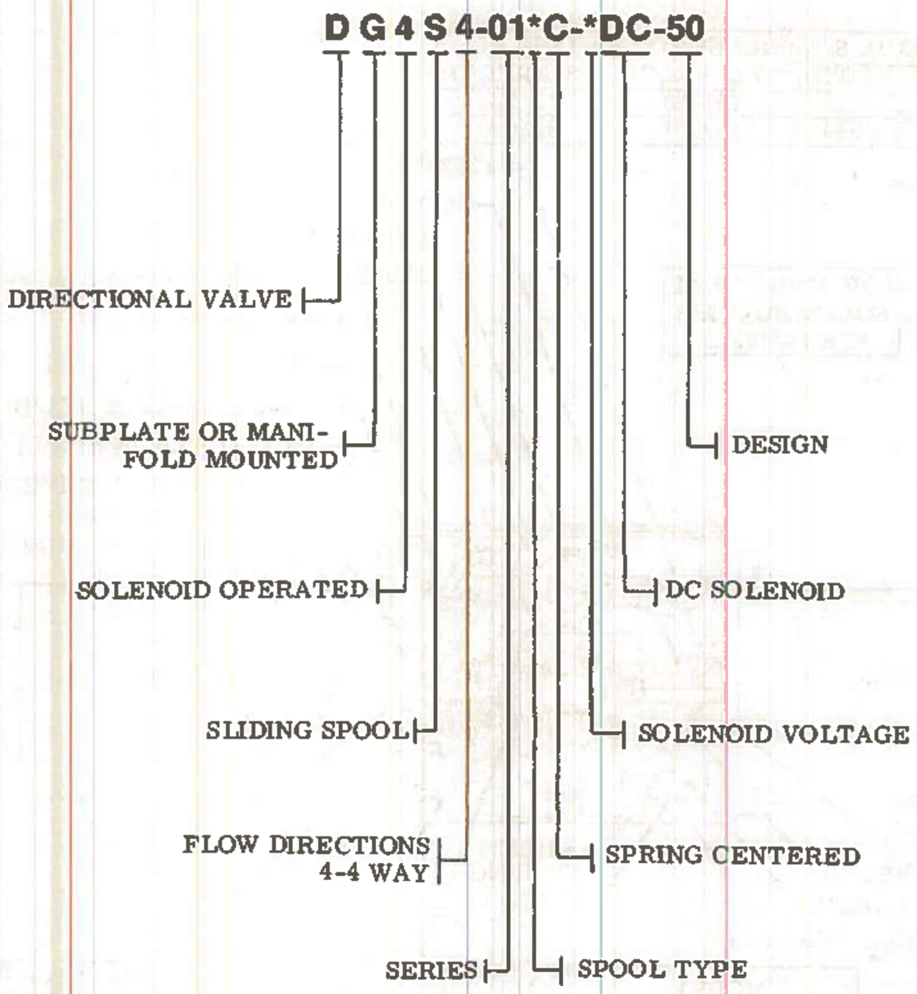
FOR ADDITIONAL SOLENOID S/A'S SEE I-3499-S



▲INCLUDED IN SEAL KIT 919359

MODEL	DIAGRAM PLATE	SPOOL	WASHER (2 REQ'D)	SPRING (2 REQ'D)	PUSH PIN (2 REQ'D)
DG4S4-010C-*DC-50	290341	213230	211846	290072	213268
DG4S4-012C-*DC-50	290343	213231			
DG4S4-013C-*DC-50	290344	239903			
DG4S4-016C-*DC-50	290345	213232			
DG4S4-017C-*DC-50	290346	236624			
DG4S4-018C-*DC-50	290340	235637	283637	217323	290264
DG4S4-0133C-*DC-50	577484	236615	211846	290072	213268

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

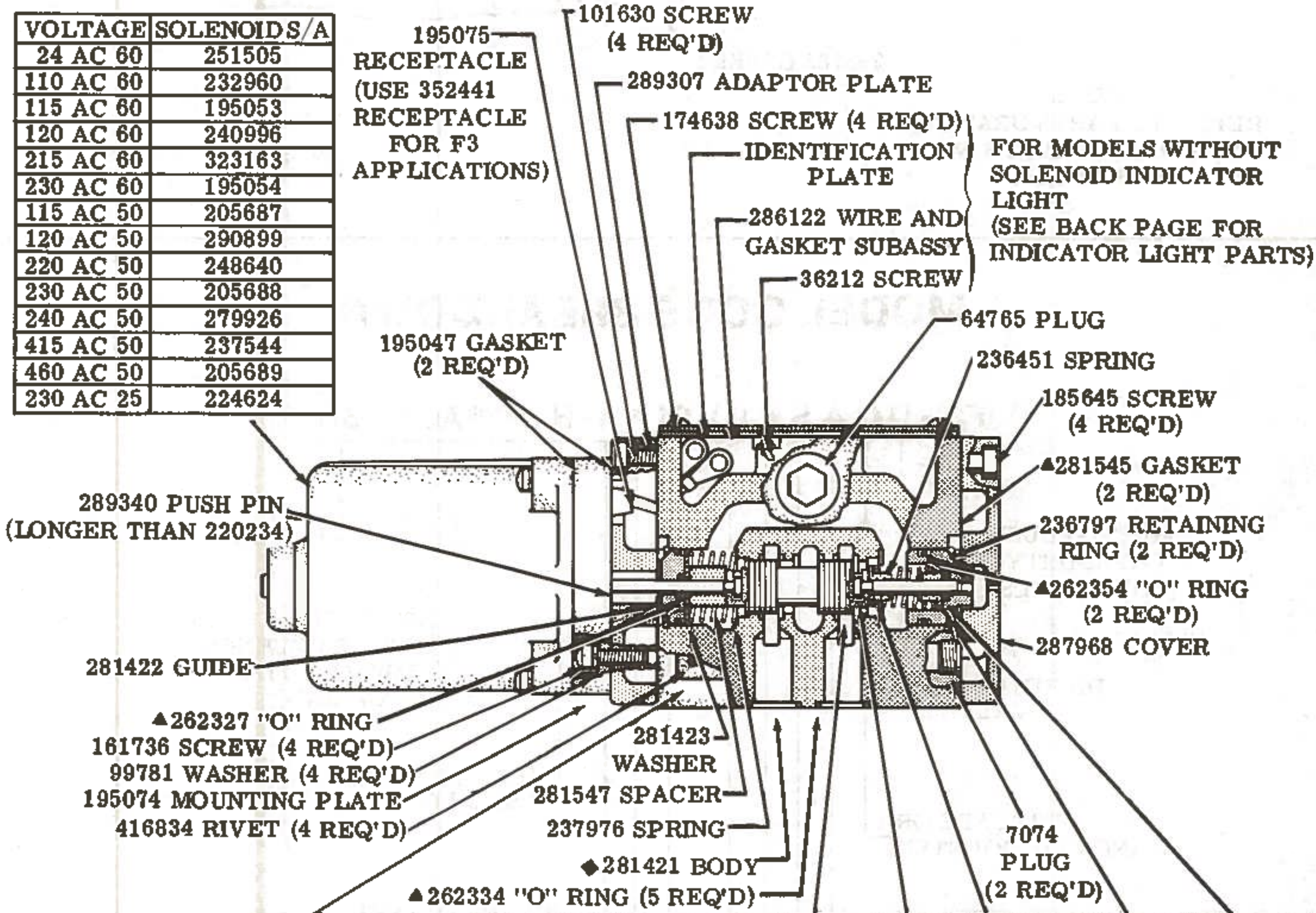
Service Parts Information

VICKERS
A TRINOVA COMPANY

SPRING OFFSET SOLENOID CONTROLLED DIRECTIONAL VALVES

DG4S*(L)-01*-A-H-(***AC*)-50

VOLTAGE	SOLENOID S/A
24 AC 60	251505
110 AC 60	232960
115 AC 60	195053
120 AC 60	240996
215 AC 60	323163
230 AC 60	195054
115 AC 50	205687
120 AC 50	290899
220 AC 50	248640
230 AC 50	205688
240 AC 50	279926
415 AC 50	237544
460 AC 50	205689
230 AC 25	224624



MODEL	DIAGRAM PLATE	
	RH	LH
DG4S2(L)-	290347	577488
DG4S4(L)-	290348	577490

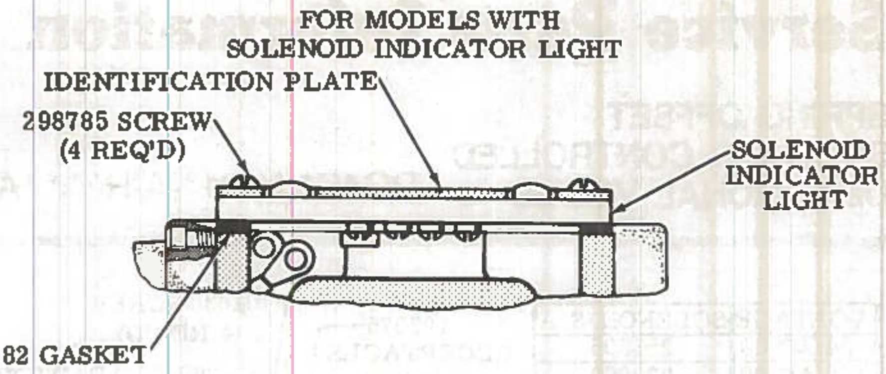
MODEL	SPOOL	PUSH PIN	LIMITER (2 REQ'D)	GUIDE	"O" RING
DG4S2(L)-012A-H-(*)-50	220344	———	———	281424	———
DG4S4(L)-010A-H-(*)-50	213230	220234	294226	284931	▲262327
DG4S4(L)-012A-H-(*)-50	213231				
DG4S4(L)-016A-H-(*)-50	213232				

RIGHT HAND ASSEMBLY SHOWN. IN LEFT HAND ASSEMBLY ALL PARTS OF VALVE EXCEPT BODY ARE REVERSED. EXAMPLE OF L.H. MODEL: DG4S4-012A-H-50-LH

▲INCLUDED IN F3 SEAL KIT 919359

◆NOT AVAILABLE FOR SALE

SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615



NOTE
REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURE.

MODEL CODE BREAKDOWN

(F3)- D G 4 S * (L)- 01 * A - H -(*AC*)- 50**

- (F3) — MULTI-FLUID CAPABILITY (VITON SEALS)
- D — DIRECTIONAL VALVES
- G — SUBPLATE OR MANIFOLD MOUNTED
- 4 — SOLENOID OPERATED
- S — SLIDING SPOOL
- * — FLOW DIRECTIONS 2-2 WAY 4-4 WAY
- (L) — L - SOLENOID INDICATOR LIGHT; OMITTED - NONE
- 01 — SERIES
- * — SPOOL TYPE
- A — SPRING OFFSET
- H — OIL IMMERSED SOLENOID
- (***AC*) — SOLENOID VOLTAGE AND FREQUENCY OMITTED-115AC60 STANDARD.
- 50 — DESIGN

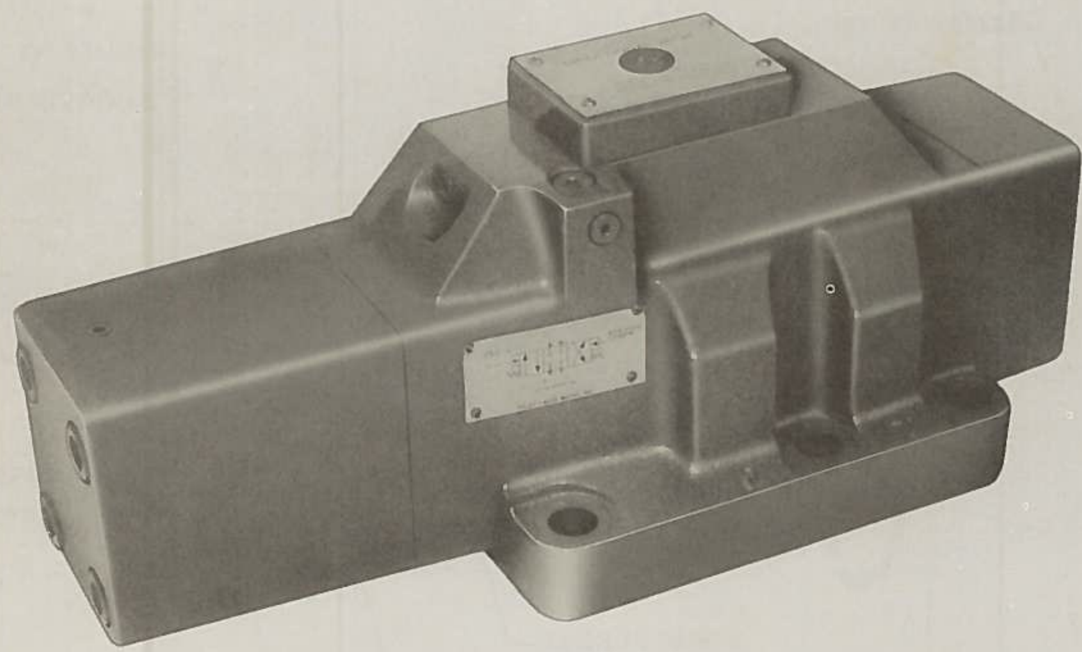
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

VICKERS

Service Parts Information

Pressure Centered Pilot Operated Directional Control Valves

DG3S4-10*D*-*-53



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Revised 11-1-85

I-3569-S

A Libbey-Owens-Ford Company

MODEL	SPOOL	DIAGRAM PLATE
DG3S4-100D(X)-*-53	364037	400967
DG3S4-101D(X)-*-53	*331404	400968
DG3S4-102D(X)-*-53	364038	400969
DG3S4-103D(X)-*-53	*277479	400970
DG3S4-104D(X)-*-53	281193	400971
DG3S4-106D(X)-*-53	364039	400972
DG3S4-108D(X)-*-53	364041	400971
DG3S4-109D(X)-*-53	277563	400967
DG3S4-1033D(X)-*-53	364042	400972

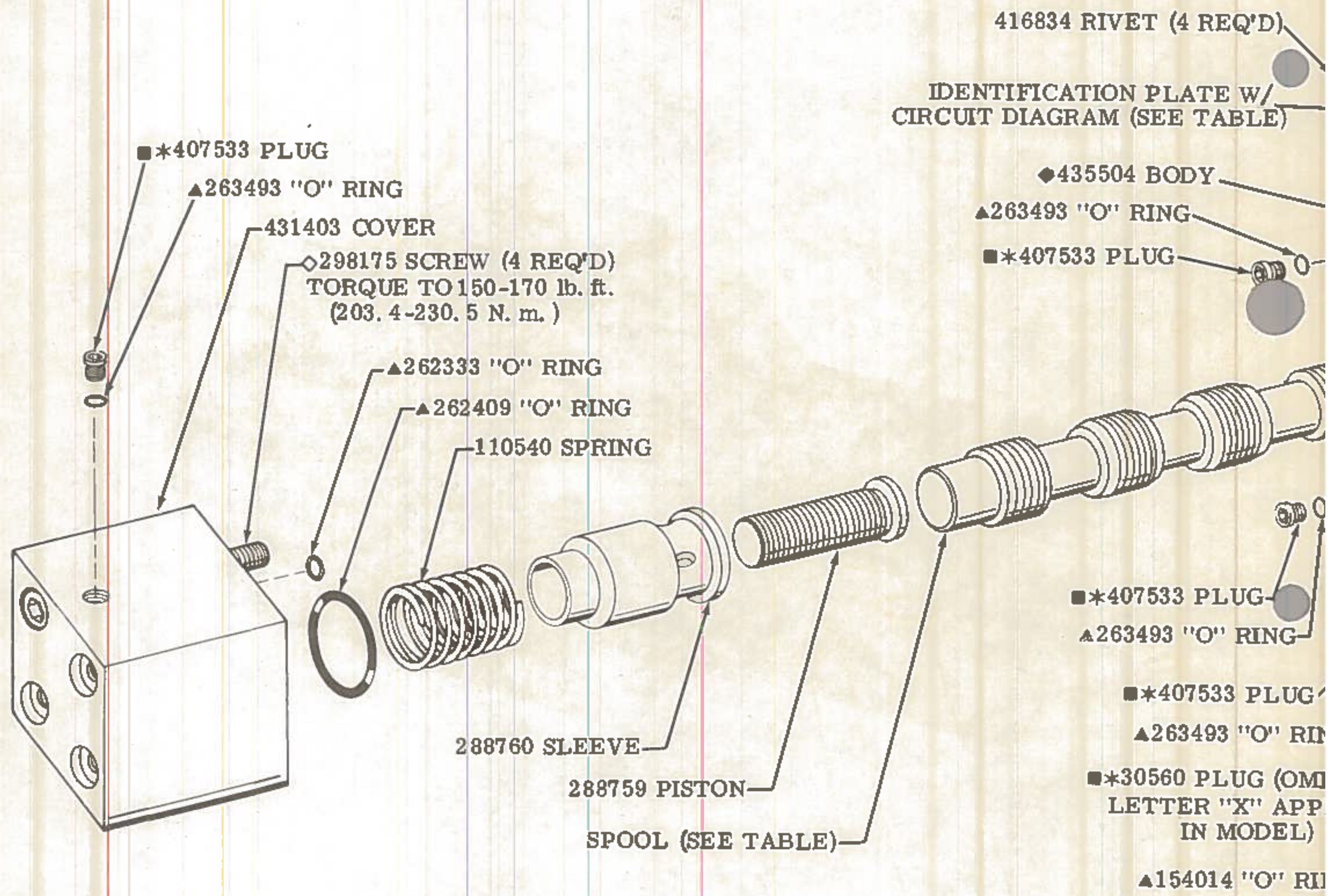
■ PLUG TORQUES (OILED)

PLUG	N. m.	lb. in.
7074	8.5 - 9.6	75-85
30560	8.5 - 9.6	75-85
343740	10.0 -11.8	90-105
363889	16.9 -18.0	150-160
407533	3.4 - 4.0	30-35

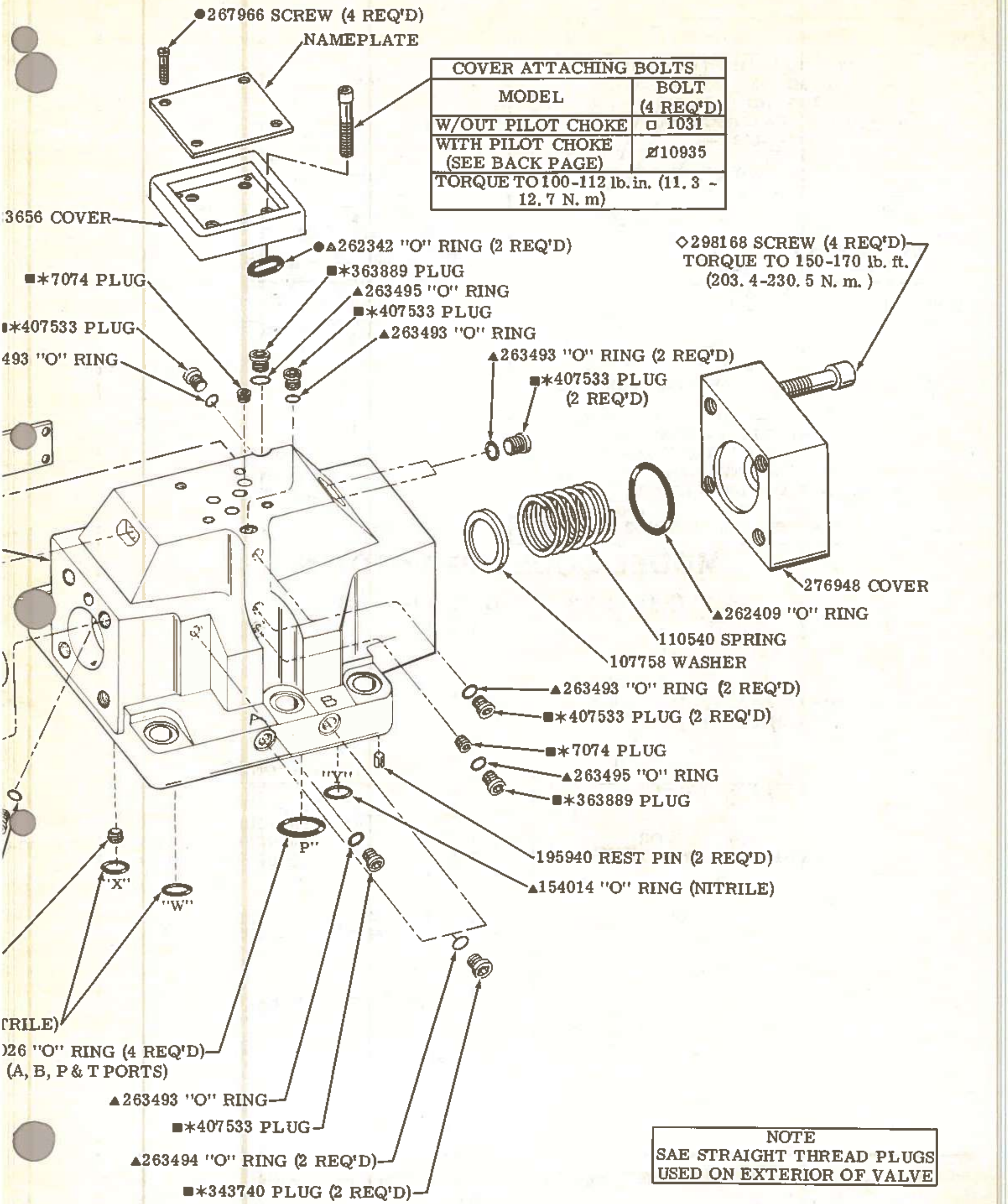
NOTE
PARTS INCLUDED IN SERVICE KITS NOT SOLD SEPARATELY

***SPOOL ASSEMBLY NOTE**
ASSEMBLE TYPE 1 & 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END IS DEFINED AS BEING CLOSEST TO CYLINDER PORT "A".

SEAL KIT NOTE
The -53 design valves are manufactured as shown with F3 seals used internally. Interface seals are standard Nitrile material and are converted to F3 in the seal kit. All seals in the seal kit are F3.



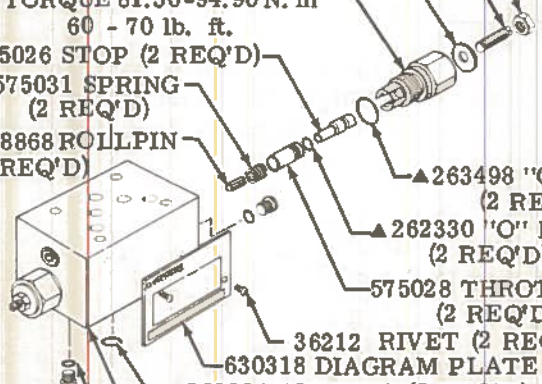
▲INCLUDED IN F3 SEAL KIT 920150
□INCLUDED IN FASTENER KIT 941257
⌀INCLUDED IN BOLT KIT 255620
◇INCLUDED IN FASTENER KIT 941273
*INCLUDED IN PLUG KIT 941263
●INCLUDED IN COVER KIT 942024
■PLUG TORQUES (SEE TABLE)
◆NOT AVAILABLE FOR SALE



COVER ATTACHING BOLTS	
MODEL	BOLT (4 REQ'D)
W/OUT PILOT CHOKE	□ 1031
WITH PILOT CHOKE (SEE BACK PAGE)	⌀10935
TORQUE TO 100-112 lb.in. (11. 3 - 12. 7 N. m)	

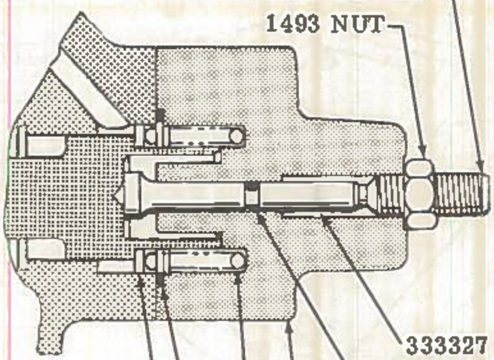
NOTE
SAE STRAIGHT THREAD PLUGS USED ON EXTERIOR OF VALVE

MODELS WITH PILOT CHOKE
DGMFN-5-Y-AW-BW-20



▲INCLUDED IN 920246 SEAL KIT

STROKE ADJUSTMENT PARTS
("B" END ONLY)



MODEL CODE BREAKDOWN

(F3) - D G 3 S 4 - 10 * D (X) - * - 53

- (F3) — SEALS FOR MINERAL OIL OR FIRE RESISTANT FLUID
- D — DIRECTIONAL VALVE
- G — SUBPLATE OR MANIFOLD MOUNTED
- 3 — PILOT OPERATED
- S — SLIDING SPOOL
- 4 — FLOW DIRECTIONS: 4 - 4 WAY
- 10 — SERIES 100 (1.250 INCH)
- * — SPOOL TYPE
- D — PRESSURE CENTERED
- (X) — X - FAST RESPONSE MODEL; OMITTED - STD LOW SHOCK MODELS
- * — SPOOL CONTROL MODIFICATION (OMIT IF NOT REQUIRED)
  - 2 - PILOT CHOKE ADJS.
  - 8 - STROKE ADJUSTMENT CYLINDER "B" END ONLY
  - 2-8 - IF BOTH ARE REQUIRED
- 53 — DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

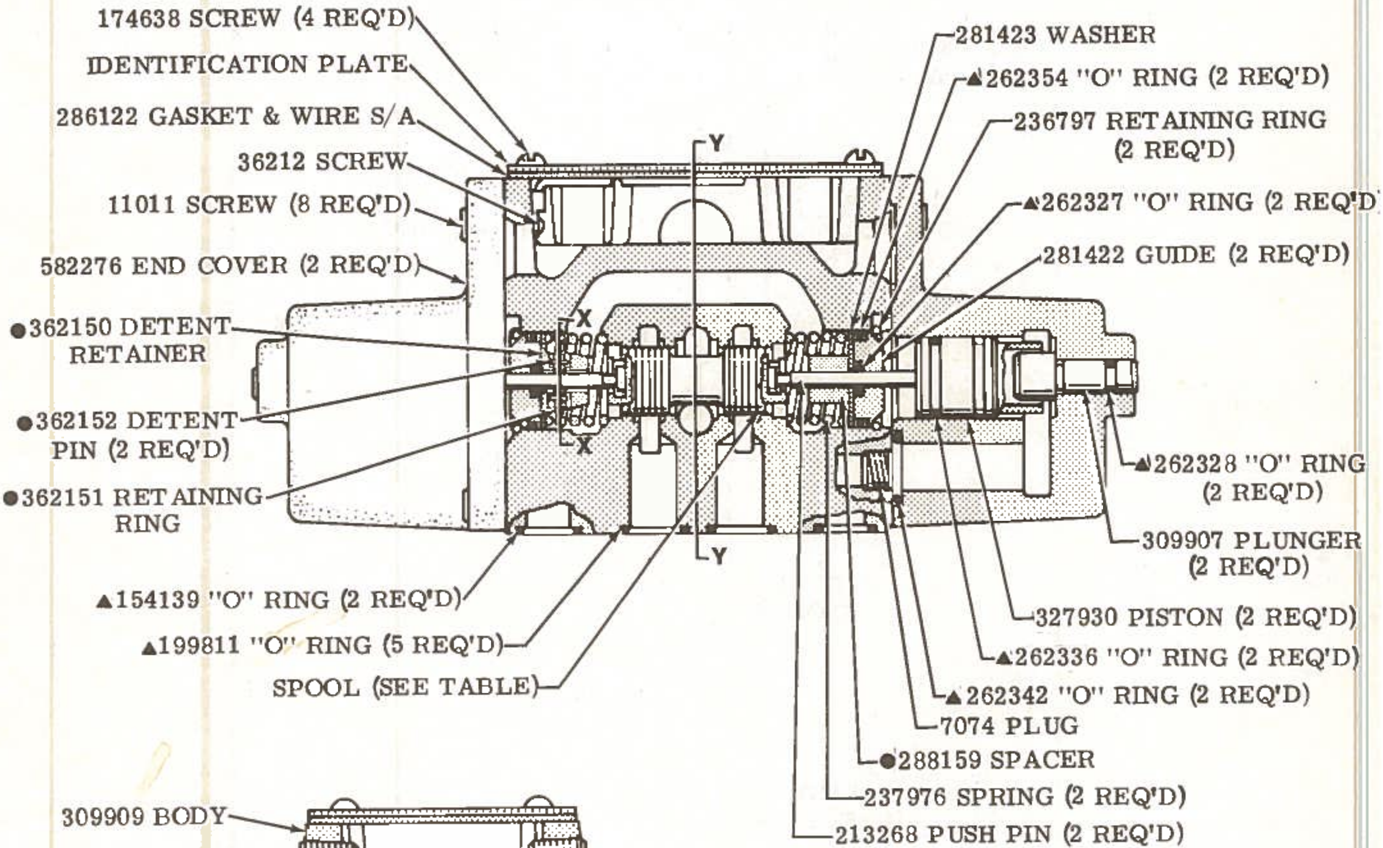
Litho in U.S.A.

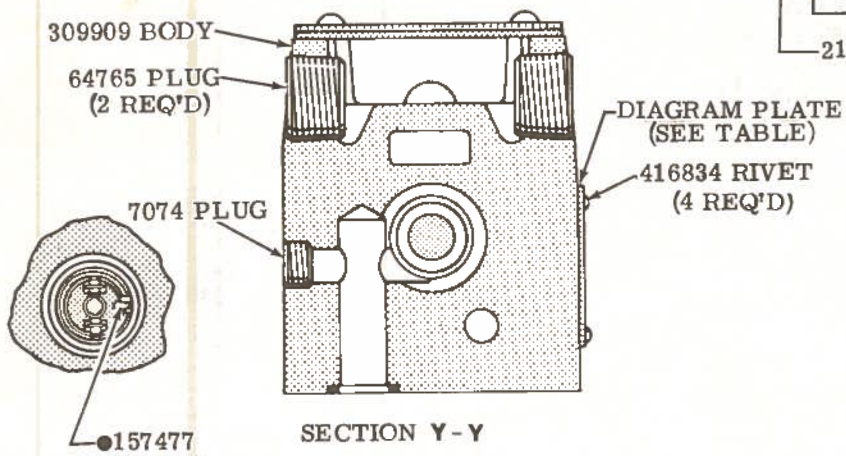
VICKERS

NO-SPRING DETENTED AIR OPERATED DIRECTIONAL VALVES

Service Parts Information

DG18S2-012N-52
DG18S4-01*(*)N-52





SECTION X-X

SECTION Y-Y

MODEL	SPOOL	DIAGRAM PLATE
DG18S2-012N-52	289186	578457
DG18S4-010N-52	213230	578458
DG18S4-012N-52	213231	
DG18S4-016N-52	213232	
DG18S4-017N-52	236624	
DG18S4-0129N-52	*213231	578459
DG18S4-0133N-52	236615	578458

*TYPE 29 SPOOL IS FOR USE AS PILOT FOR NO SPRING DETENTED TWO STAGE VALVE ONLY.

▲INCLUDED IN 919681 SEAL KIT

●INCLUDED IN 942132 DETENT KIT

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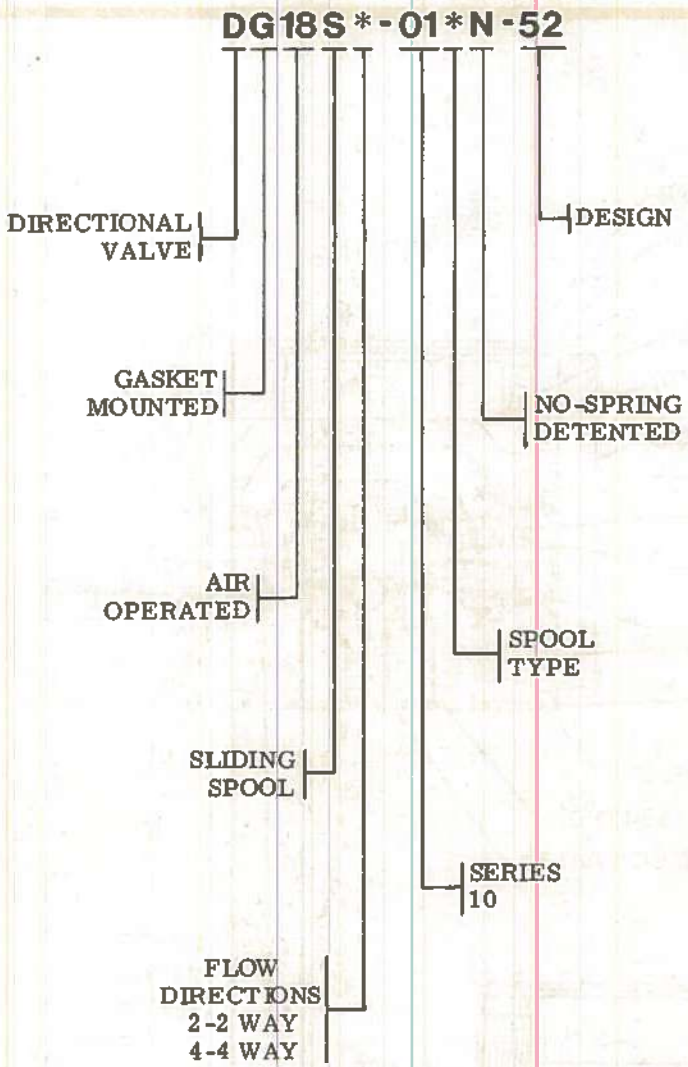
MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

VICKERS

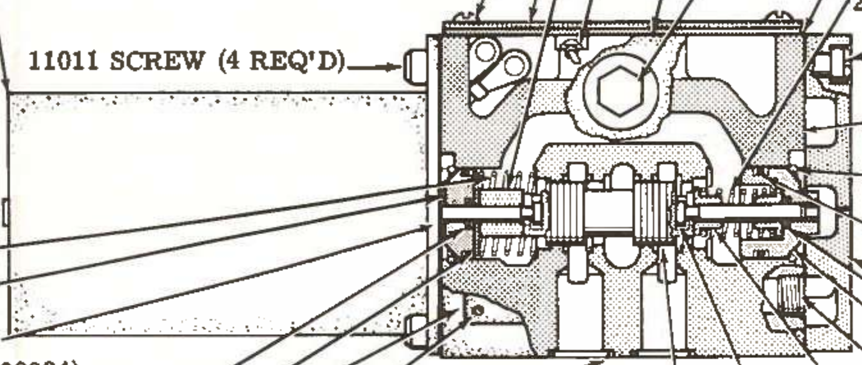
SPRING OFFSET SOLENOID CONTROLLED DIRECTIONAL VALVES

Service Parts Information

DG4S2-012A-*DC-50
DG4S4-01*A-*DC-50

VOLTAGE DC	SOLENOID S/A (2 REQ'D)	COIL S/A (2 REQ'D)	SOLENOID S/A F3 (2 REQ'D)	COIL S/A F3 (2 REQ'D)
12	290839	291583	751283	751284
24	290840	291584	393091	393090

FOR ADDITIONAL SOLENOID S/A SEE I-3499-S



MODEL	DIAGRAM PLATE	
	RH	LH
DG4S2(L)-	290347	577488
DG4S4(L)-	290348	577490

MODEL	SPOOL	PUSH PIN	LIMITER (2 REQ'D)	GUIDE	▲"O' RING
DG4S2-012A-*DC-50	220344	———	———	281424	———
DG4S4-010A-*DC-50	213230				
DG4S4-012A-*DC-50	213231	220234	294226	284931	26232'
DG4S4-016A-*DC-50	213232				

RIGHT HAND ASSEMBLY SHOWN. IN LEFT HAND ASSEMBLY ALL PARTS OF VALVE EXCEPT BODY ARE REVERSED. EXAMPLE OF L.H. MODEL:
DG4S4-012A-*DC-50-LH

▲INCLUDED IN F3 SEAL KIT 919359

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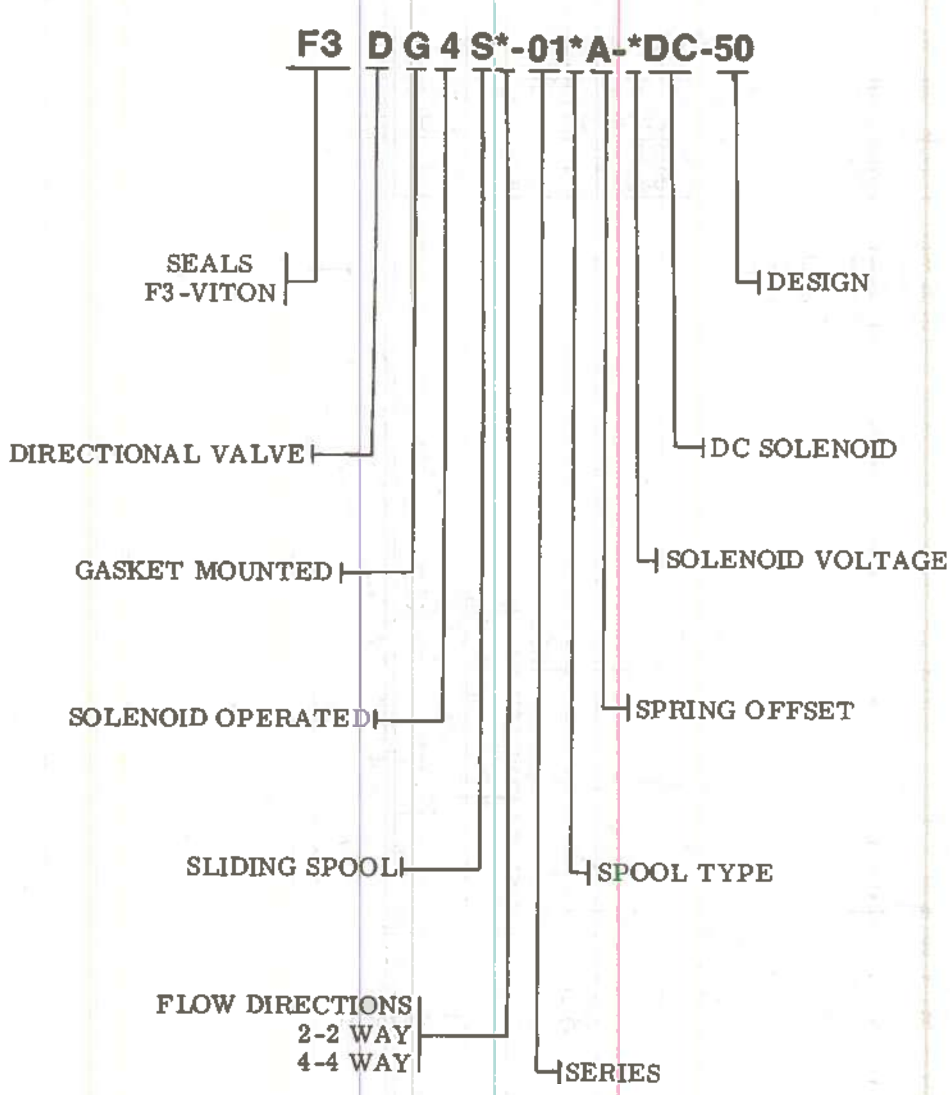
MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

Service Parts Information

PRESSURE CONTROL VALVES

R(C)G-03-*P*-30

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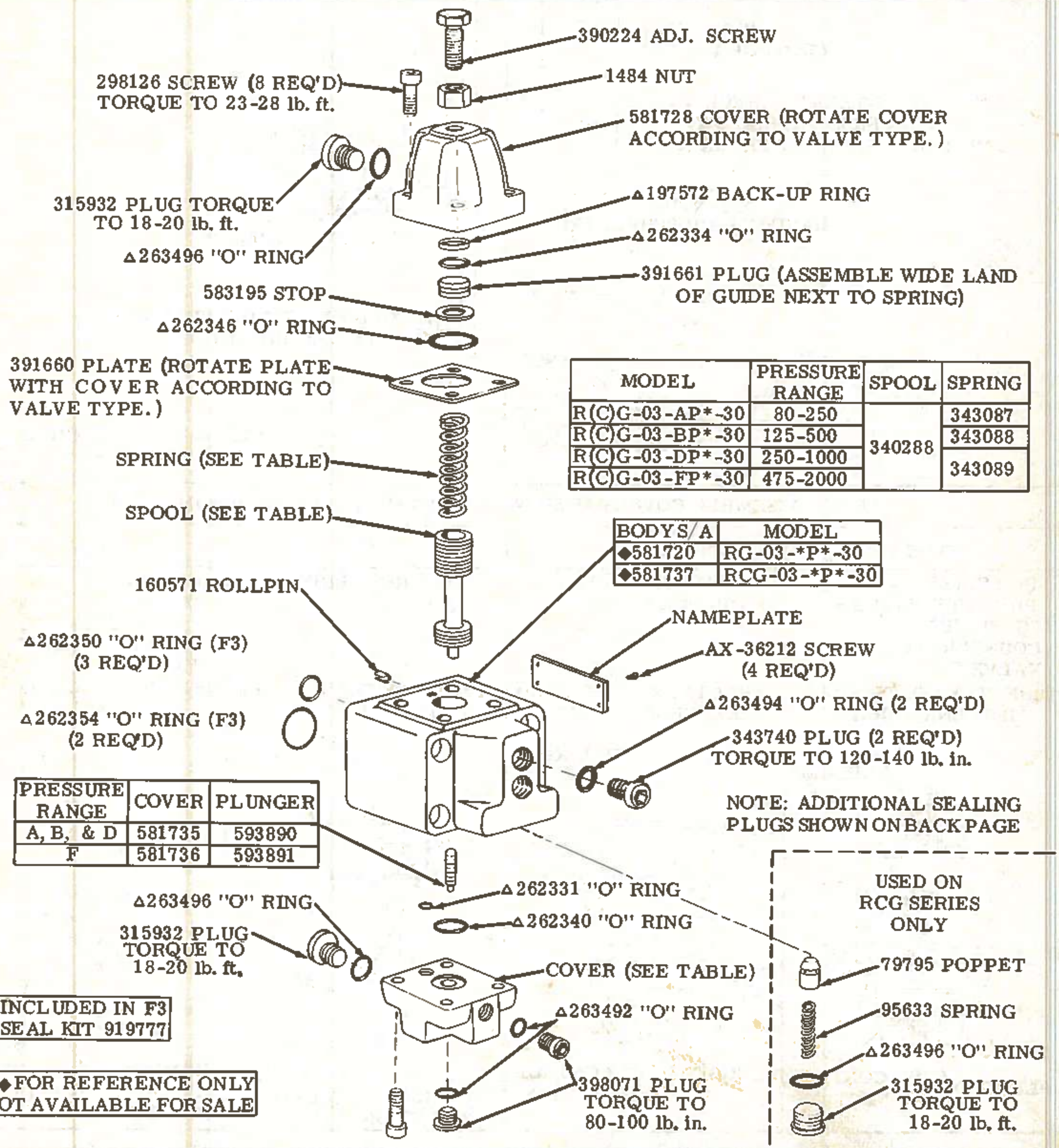

MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)G-03-AP*-30	80-250	340288	343087
R(C)G-03-BP*-30	125-500		343088
R(C)G-03-DP*-30	250-1000		343089
R(C)G-03-FP*-30	475-2000		

BODY S/A	MODEL
◆581720	RG-03-*P*-30
◆581737	RCG-03-*P*-30

PRESSURE RANGE	COVER	PLUNGER
A, B, & D	581735	593890
F	581736	593891

△INCLUDED IN F3 SEAL KIT 919777

◆FOR REFERENCE ONLY NOT AVAILABLE FOR SALE

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MODEL CODE BREAKDOWN

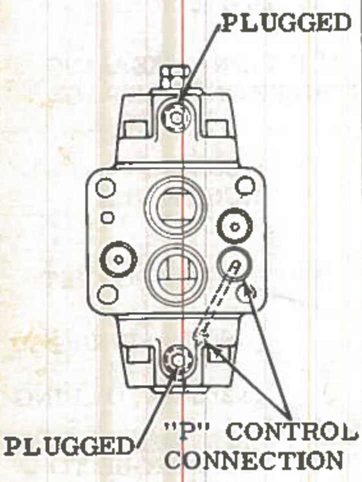
(F3)- R (C) G-03-*P*-30

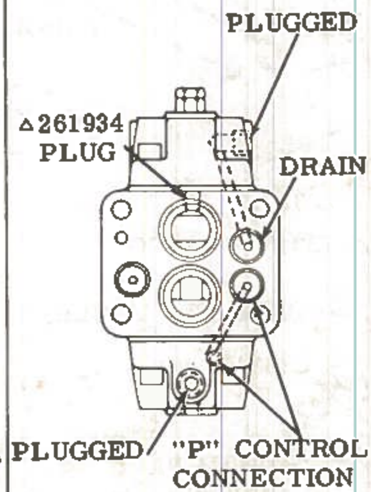
- SPECIAL SEALS (OMIT FOR STD. MODELS)
- PRESSURE CONTROL VALVE
- "C" - WITH INTEGRAL CHECK VALVE (REVERSE FREE FLOW)
  OMITTED - WITHOUT CHECK VALVE
- MOUNTING MANIFOLD OR SUBPLATE
- NOMINAL VALVE SIZE
  03 - 3/8"
- PRESSURE RANGE
  A - 80-250 P.S.I.
  B - 125-500 P.S.I.
  D - 250-1000 P.S.I.
  F - 475-2000 P.S.I.
- AUXILIARY REMOTE PRESSURE CONTROL CONNECTION
- VALVE TYPES (INSET VIEWS AT BOTTOM OF PAGE SHOW COVER POSITIONS FOR THE (4) VALVE TYPES)
- DESIGN

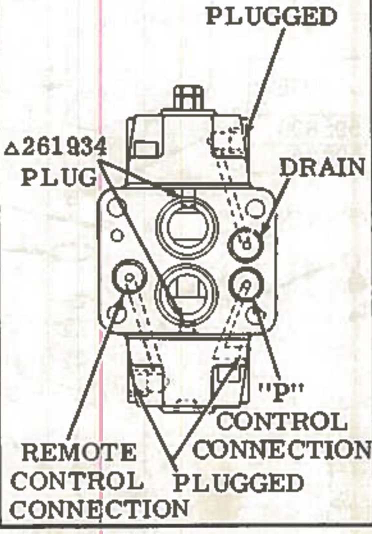
TYPICAL MODEL NUMBER
RCG-03-DP4-30

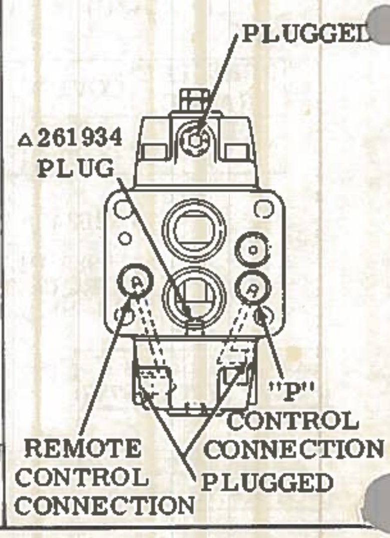
NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RG SERIES - BACK PRESSURE VALVE RCG SERIES - COUNTERBALANCE VALVE	RG OR RCG SERIES-SEQUENCE VALVES	RG OR RCG SERIES-SEQUENCE VALVES	RG SERIES-UNLOADING VALVE RCG SERIES-COUNTERBALANCE VALVE
DIRECTLY CONTROLLED INTERNAL DRAIN	DIRECTLY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED INTERNAL DRAIN









For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

VICKERS®
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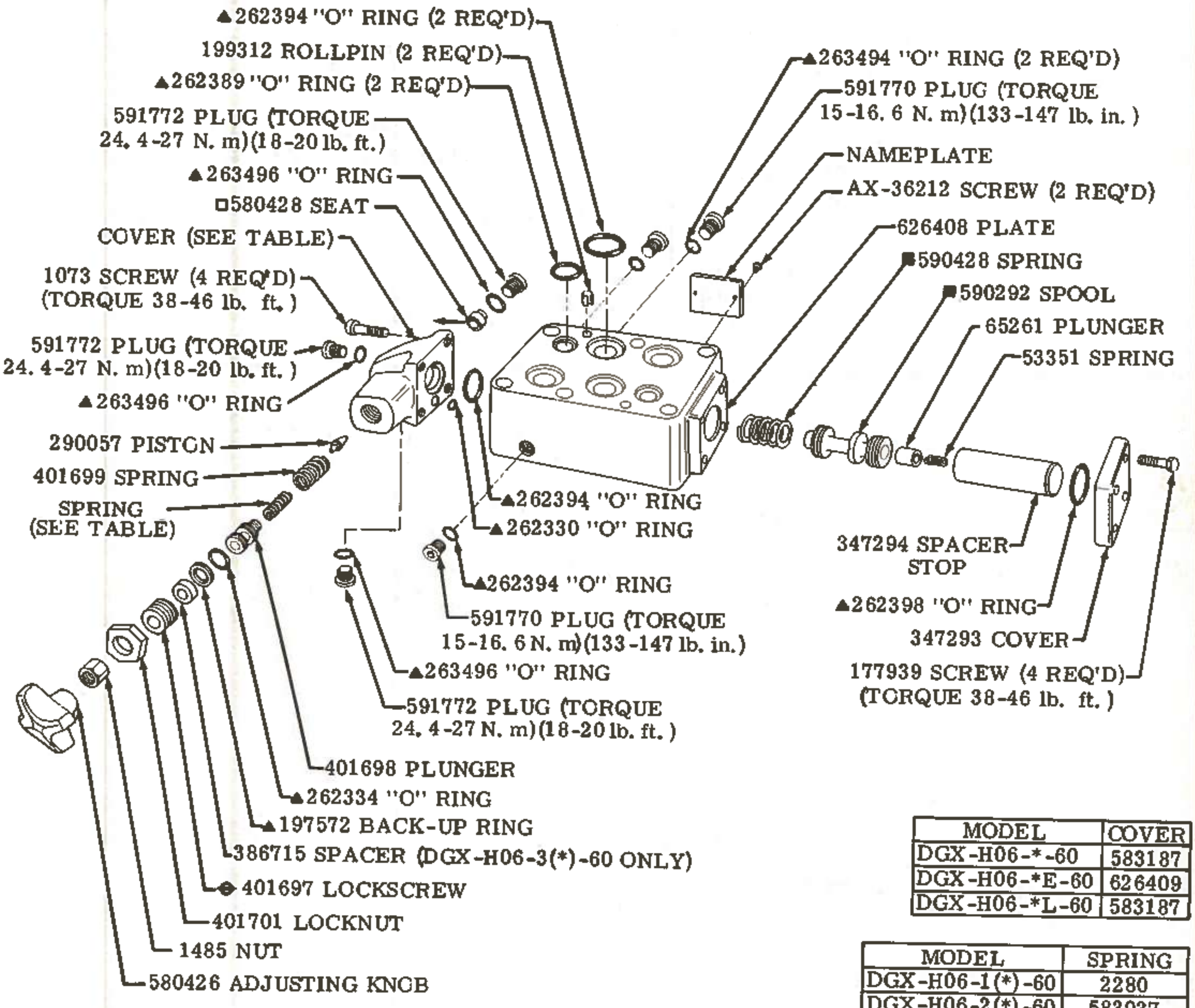
PRESSURE REDUCING VALVES

(F3)DGX-H06-*(*)-60



MODEL	COVER
DGX-H06-*-60	583187
DGX-H06-*E-60	626409
DGX-H06-*L-60	583187

MODEL	SPRING
DGX-H06-1(*)-60	2280
DGX-H06-2(*)-60	583937
DGX-H06-3(*)-60	401700

■ INCLUDED IN SPOOL KIT 941390

▲SERVICE ALL UNITS W/F3 SEAL KIT 920126

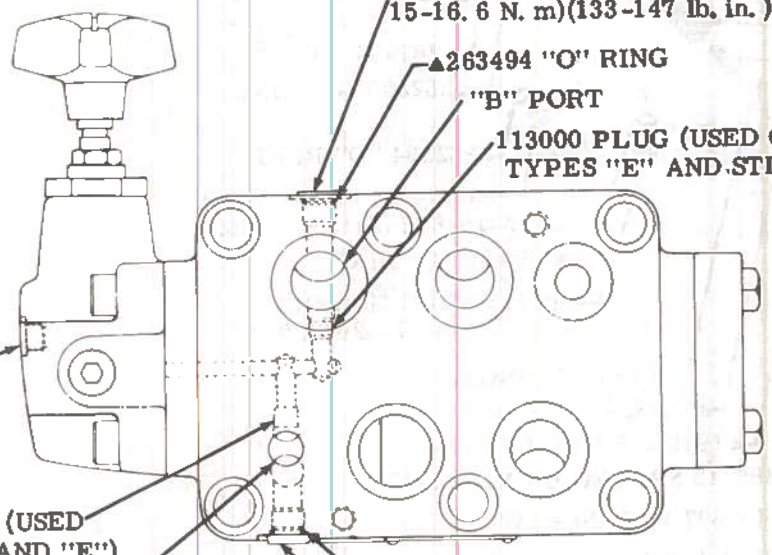
⊖ASSEMBLE 401697 LOCKSCREW WITH STEPPED O.D. END TOWARD 386715 SPACER OR PLUNGER.

□NOTE
ASSEMBLE SEAT IN COVER WITH CROSSHOLE POINTING IN DIRECTION OF ARROW. COIN PISTON TO NEW SEAT.

MODEL CODE BREAKDOWN

(F3) DGX - H06 - * (*) - 60

- (F3) — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- D — DIRECTIONAL CONTROL
- G — SUBPLATE OR MANIFOLD MOUNTED
- X — PRESSURE REDUCING MODULE
- H — HIGH FLOW CAPACITY 70 USGPM MODEL
- 06 — 06 - 3/4 INCH SIZE
- * — MAXIMUM ADJUSTABLE PRESSURE 1-1000 PSI, 2-2000 PSI, 3-2850 PSI
- (*) — (OMITTED) STD. EXT. DRAINED TO "Y" PORT. TYPE "E" EXT. DRAINED THRU COVER. TYPE "L" INT. DRAINED TO "B" PORT.
- 60 — DESIGN



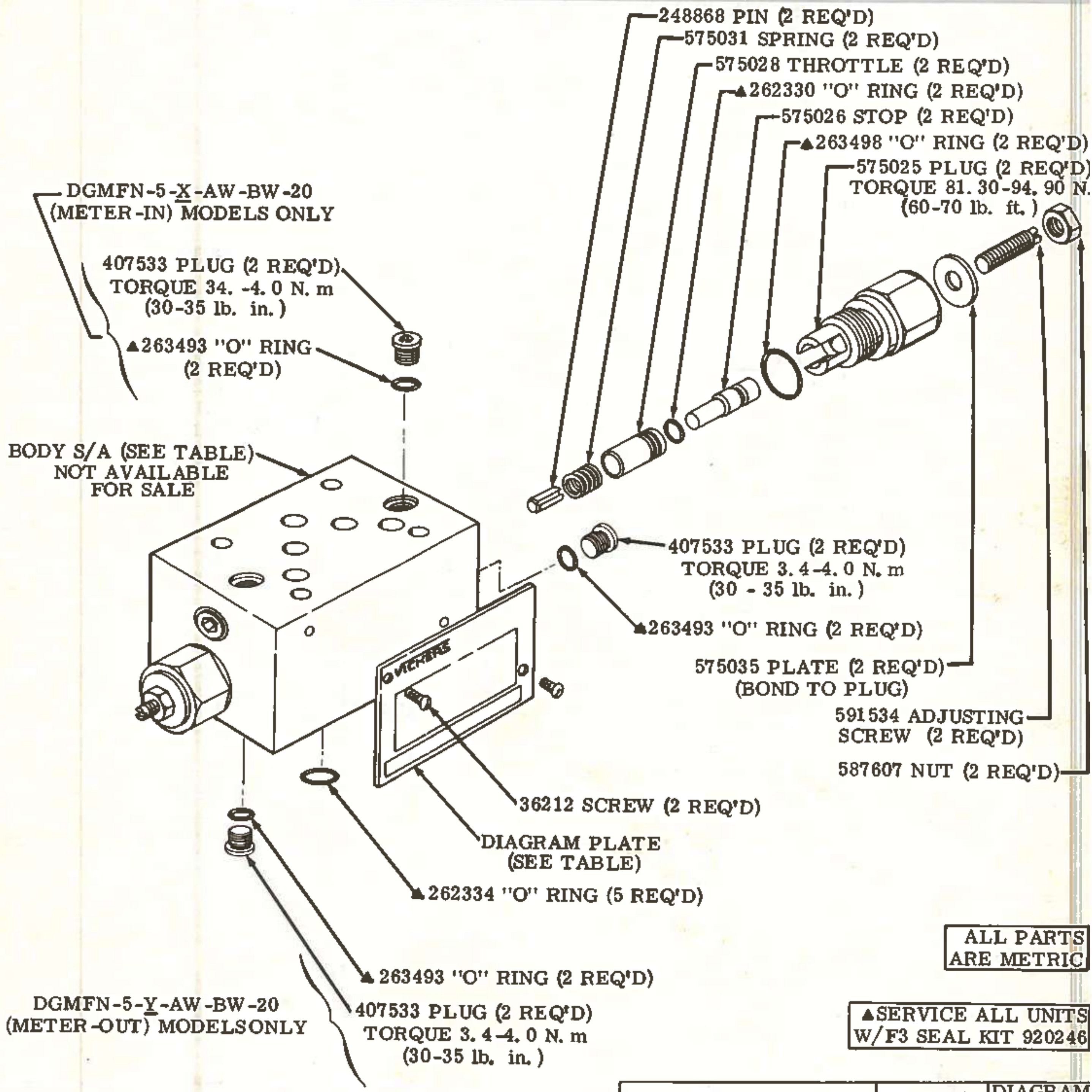
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

VICKERS

FLOW CONTROL MODULE

Service Parts Information

DGMFN-5-X-AW-BW-20 DGMFN-5-Y-AW-BW-20



ALL PARTS ARE METRIC

▲SERVICE ALL UNITS W/F3 SEAL KIT 920246

MODEL	BODY S/A	DIAGRAM PLATE
DGMFN-5-X-AW-BW-20	587975	630317
DGMFN-5-Y-AW-BW-20	575039	630318

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MODEL CODE BREAKDOWN

F3-DGM FN -5 - * - A W -B W -20

- F3 — MULTI-FLUID CAPABILITIES (VITON SEALS)
- DGM — MODULAR VALVE
- FN — FLOW REGULATOR NON-COMPENSATOR
- 5 — INTERFACE CETOP-5/ NFPA-D02
- * — DIRECTION OF FLOW
  X - METER IN
  Y - METER OUT
- A — PORT OPERATED UPON A PORT
- W — ADJUSTMENT MECHANISM STANDARD SLOTTED SCREW AND LOCKNUT
- B — PORT OPERATED UPON B PORT
- W — ADJUSTMENT MECHANISM STANDARD SLOTTED SCREW AND LOCKNUT
- 20 — DESIGN

To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

Litho in U. S. A

Service Parts Information

VICKERS
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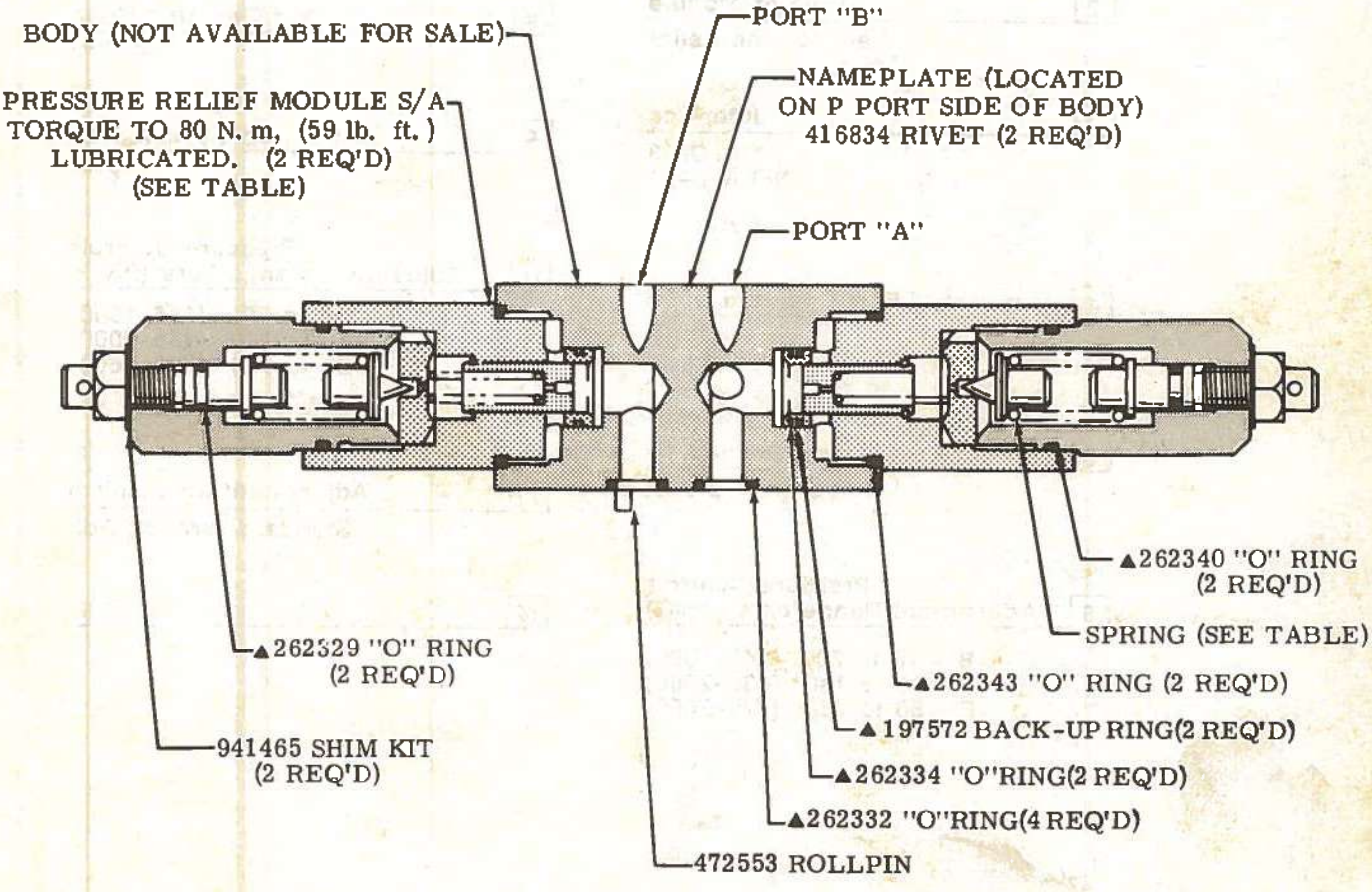
PRESSURE RELIEF MODULE

DGMC2-3-AB-*W-BA-*W-31

MODEL	SPRING	PRESSURE RELIEF MODULE S/A	PRESSURE RANGE	
			(bar)	(PSI)
DGMC2-3-AB-BW-BA-BW-31	531671	531928	10-70	145-1000
DGMC2-3-AB-CW-BA-CW-31	531672	531529	30-140	435-2000
DGMC2-3-AB-FW-BA-FW-31	531673	531930	50-250	725-3600



▲INCLUDED IN F3 SEAL KIT 920252

MODEL CODE BREAKDOWN

DGM C2 -3- A B -* W -B A -* W -31

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12]

1 Modular Valves

2 Type of Module
Service Line Relief

3 Interface
CETOP 3
NFPA-D-01

4 Port Operated Upon
A Port

5 Port Drained To
B Port

6 Pressure Controls Adjustment Range bars (PSIG)
B - 10 to 70 (145-1000)
C - 30 to 140 (435-2000)
F - 50 to 250 (725-3600)

7 Adjustment Mechanism
Standard Wrench Adj.

8 Port Operated Upon
B Port

9 Port Drained To
A Port

10 Pressure Controls Adjustment Range bars (PSIG)
B - 10 to 70 (145-1000)
C - 30 to 140 (435-2000)
F - 50 to 250 (725-3600)

11 Adjustment Mechanism
Standard Wrench Adj.

12 Design

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

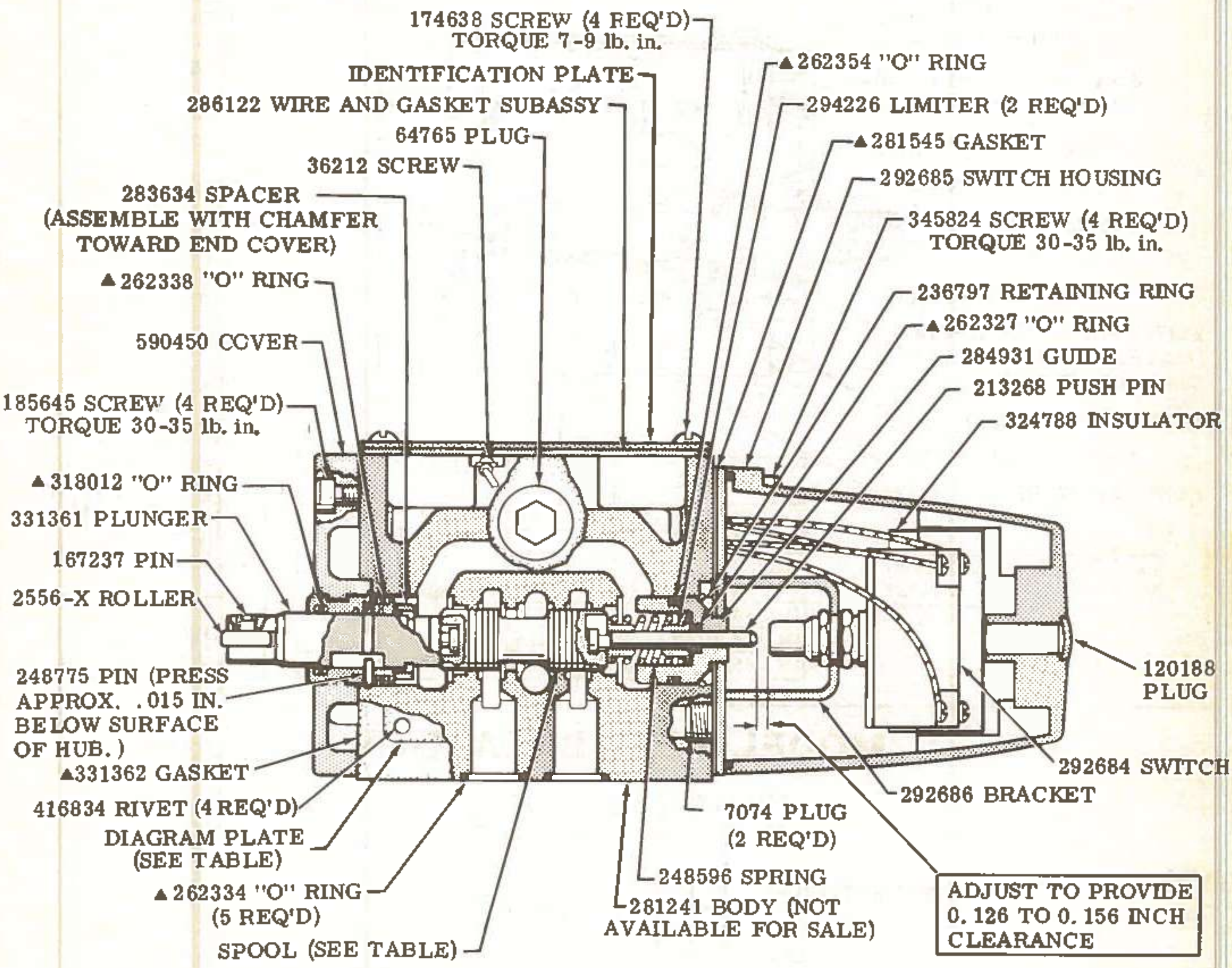
Litho in U.S.A.

VICKERS

MECHANICALLY OPERATED DIRECTIONAL AND DECELERATION VALVES

Service Parts Information

SDG2S*-012A-52 DG2S*-01*A-52 DG16S2-010A-52

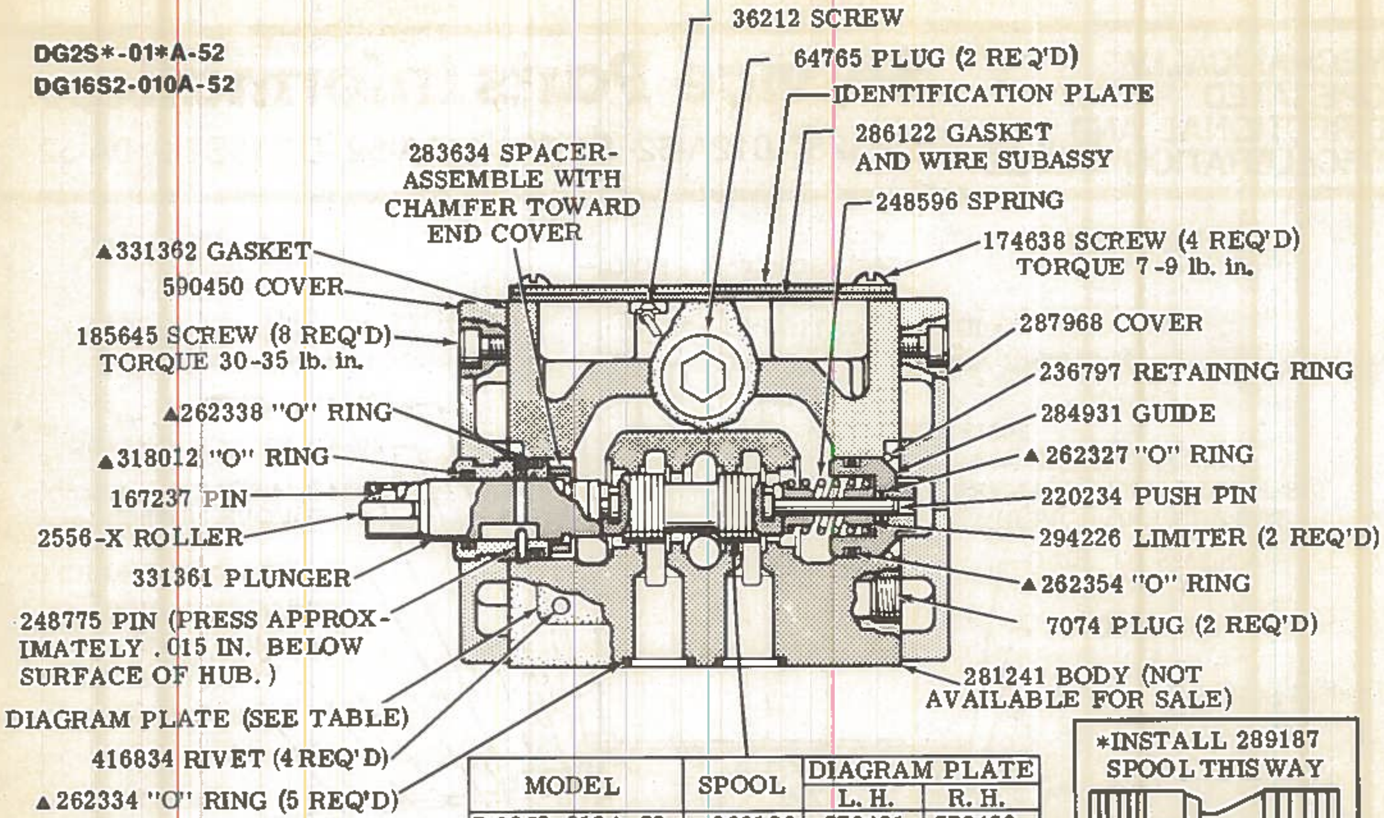


▲SERVICE ALL UNITS W/F3 SEAL KIT 919432

MODEL	SPOOL	DIAGRAM PLATE	
		L. H.	R. H.
SDG2S2-012A-52(LH)	238966	578491	578490
SDG2S4-010A-52(LH)	213230	578493	578492
SDG2S4-012A-52(LH)	213231		
SDG2S4-016A-52(LH)	213232		
SDG2S4-017A-52(LH)	236624		

RIGHT HAND ASSEMBLY SHOWN. IN LEFT HAND ASSEMBLY ALL PARTS OF VALVE EXCEPT BODY ARE REVERSED.
EXAMPLE OF L. H. MODEL: SDG2S2-012A-52-L. H.

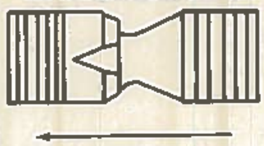
DG2S*-01*A-52
DG16S2-010A-52



MODEL	SPOOL	DIAGRAM PLATE	
		L. H.	R. H.
DG2S2-012A-52	289186	578491	578490
DG2S4-010A-52	213230		
DG2S4-012A-52	213231		
DG2S4-016A-52	213232	578493	578492
DG2S4-017A-52	236624		
DG2S4-0133A-52	236615		
DG16S2-010A-52	289187	578494	

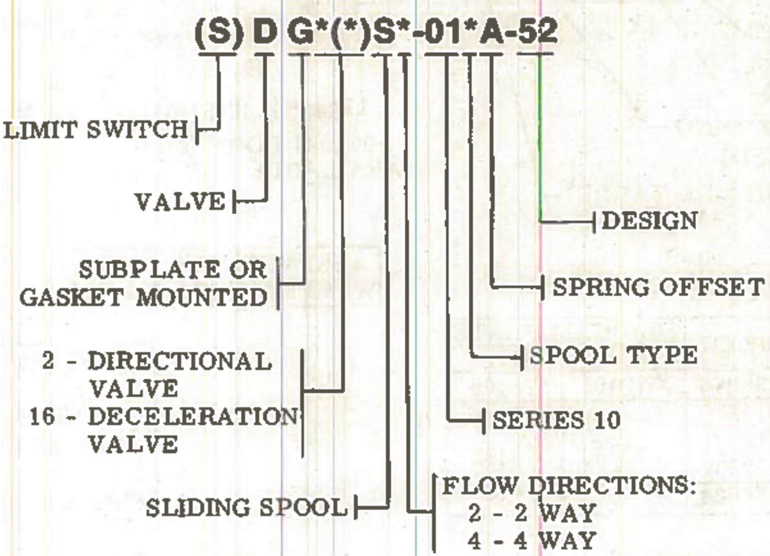
▲SERVICE ALL UNITS W/F3 SEAL KIT 919432

*INSTALL 289187 SPOOL THIS WAY



TOWARDS OPERATING STEM

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

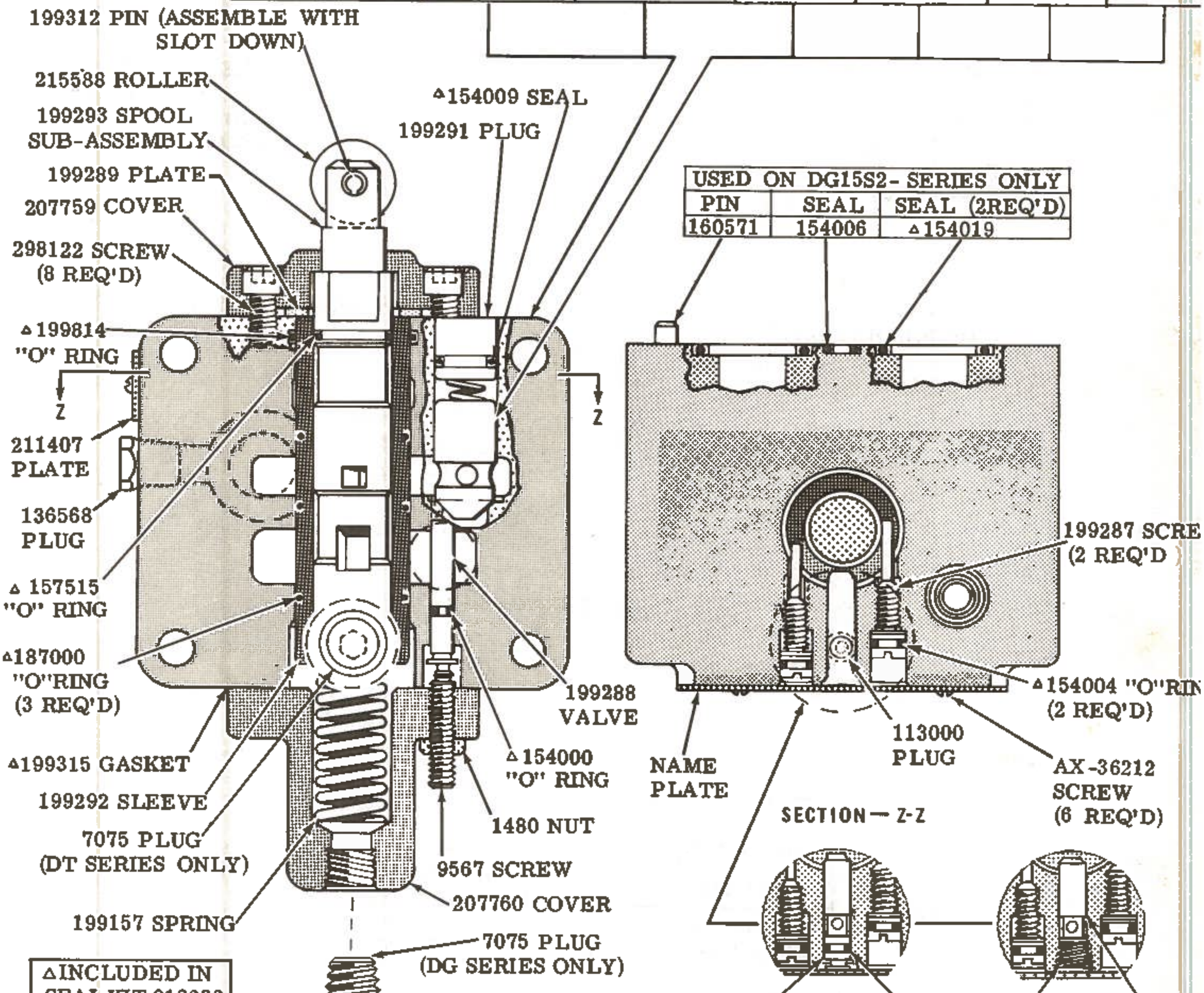
VICKERS

DECELERATION VALVES NORMALLY OPEN TYPE 3/4" NOMINAL PIPE SIZE

Service Parts Information

DG15S2 Series Gasket Mounted
DT15S2 Series Side Pipe Thd. Conn.

MODEL SERIES	BODY -10 DESIGN	BODY -11 DESIGN	POPPET	SPRING	PLUG	SEAL
DG15S2-060-K	207761	361130	118-X	20636	——	——
DT15S2-060-K	207764	361131				
DG15S2-060	207761	361130	——	——	211768	▵154006
DT15S2-060	207764	361131				



▵INCLUDED IN SEAL KIT 919236
F3 EQUIVALENT 919253

MODEL SERIES	-10 DESIGN LOCATOR	-10 DESIGN "O"RING	-11 DESIGN PLUG	-11 DESIGN LOCATOR
D*15S2-060-(K)	201955	▵154002	7074	361125

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Revised 8-1-86

MODEL CODE BREAKDOWN

D * 15 S 2-06O-(K)-10/11

- **D** — DECELERATION VALVE
- ***** — MOUNTING
  - G - GASKET MOUNTING (SEE NOTE BELOW)
  - T - SIDE PIPE CONNECTIONS
- **15** — ADJUSTABLE DECELERATION
- **S** — SLIDING SPOOL TYPE
- **2** — FLOW DIRECTION - 2 WAY
- **06** — PIPE SIZE
  - 06---3/4"
  - 08---1"
- **O** — NORMALLY OPEN TYPE
- **(K)** — WITH CHECK VALVE (REVERSE FREE FLOW) OMITTED - WITHOUT CHECK VALVE
- **10/11** — DESIGN NUMBER

NOTE: MOUNTING SUB-PLATES FOR THE GASKET MOUNTED SERIES:

SUB-PLATE	PORT SIZE	BOLT KIT BKDG15-06-627
DG15SM-06-10 DG15M-08-10	3/4" NPT 1" NPT	CONSISTS OF 4 1078-A SCREWS

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

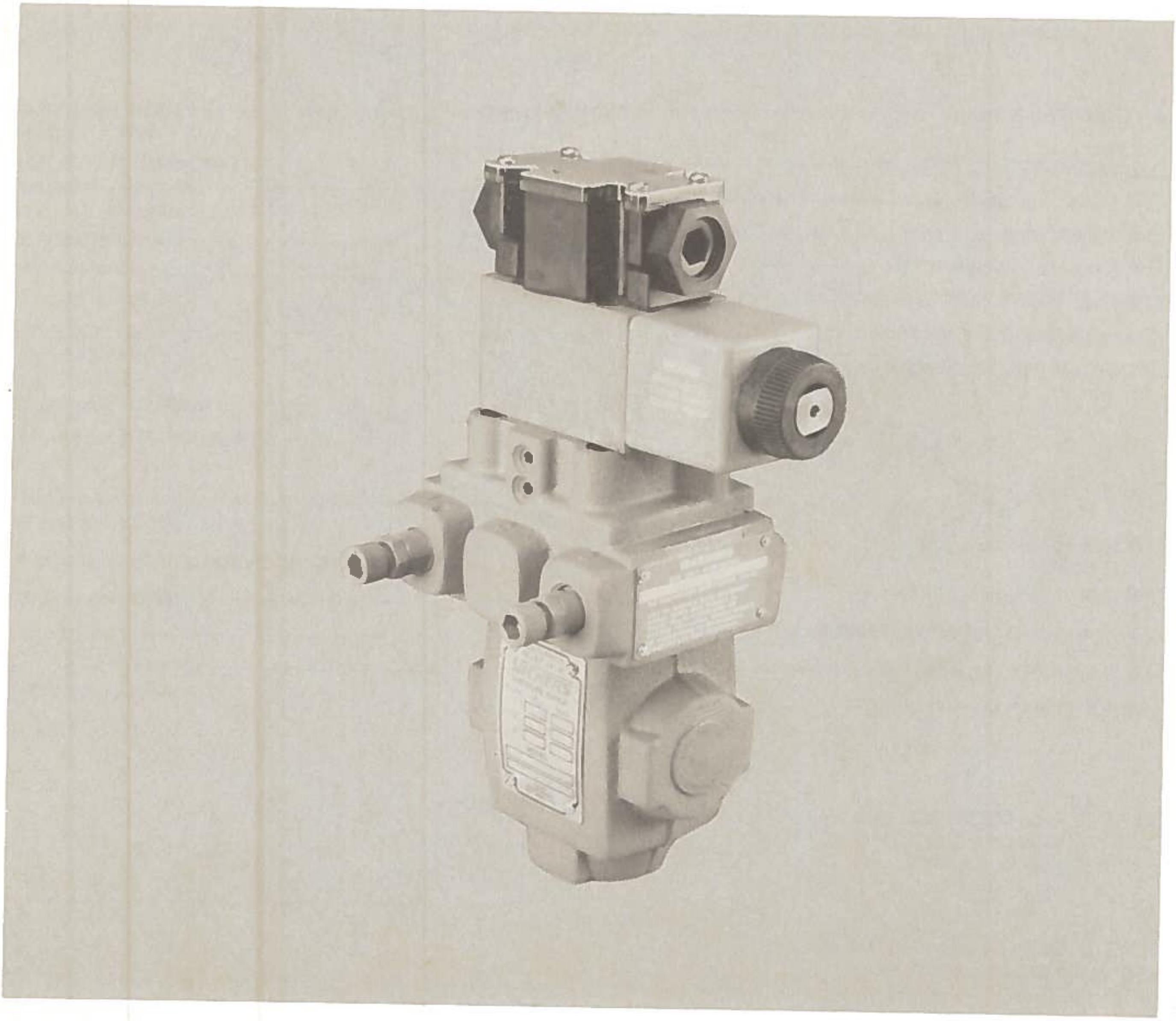
Litho In U.S.A.

Service Data

VICKERS

Multi–Pressure Relief Valves

(F3)–C/G/S/T–06/10**(*)(V)–DG–OA(L)**–(V)M–(S*)*****(L)******–40/50



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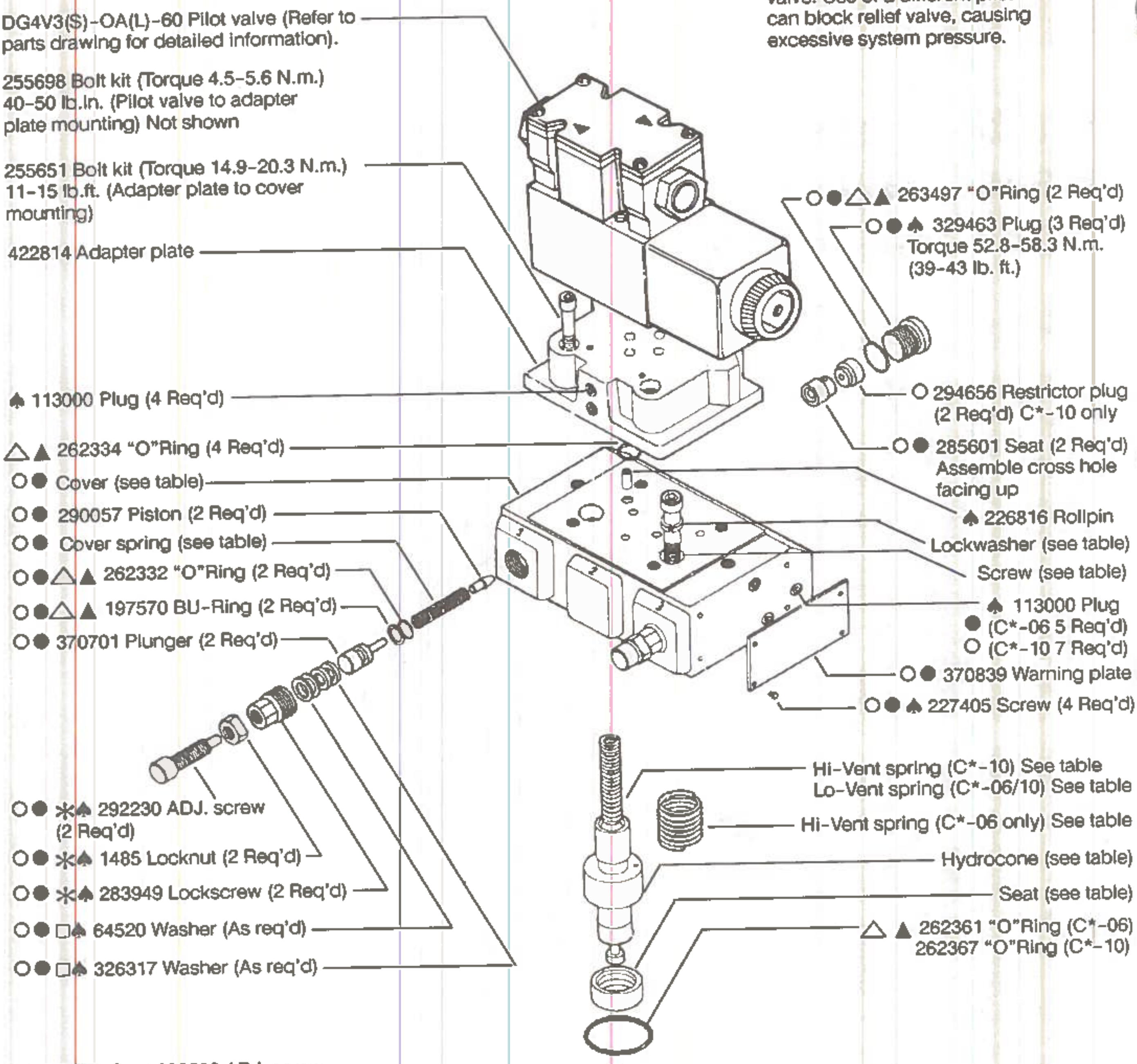
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007–0302
U.S.A.

Released 07–01–91

NOTE: Lubricate all parts & seals with a thin coat of oil at assembly.

WARNING
Use only a DG4V3(S)-OA-60 or DG4V3(S)-OAL-60 directional valve as a pilot for this relief valve. Use of a different pilot can block relief valve, causing excessive system pressure.



✱ NOTE: Coat 292230 ADJ. screw, 283949 lockscrew and 1485 locknut with oil prior to assembly.

□ NOTE: These parts used at final test to obtain correct pressure range.

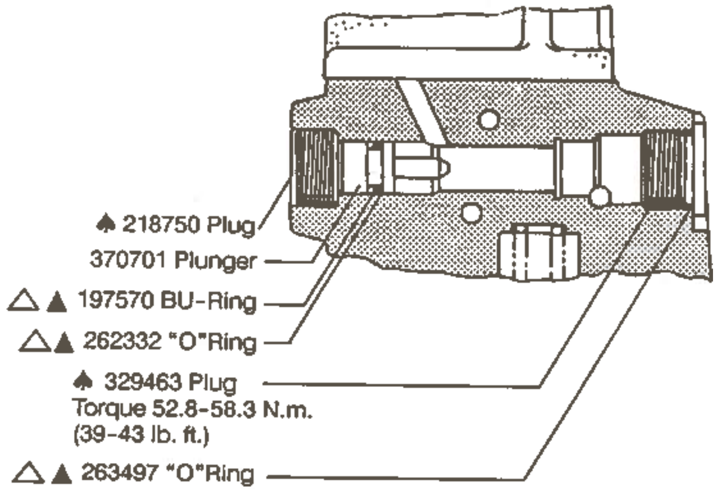
Model	Seat	Hydrocone	Lo-Vent spring	Hi-Vent spring	Cover
C*-06	343153	343154	2077	184458	● 370666
C*-10	283954	283952	291822	291821	○ 370671

NOTE: Use either a Lo-Vent or Hi-Vent spring. Do not use both. (See model code)

NOTE:
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. OFP, OFR, and OFRS series filters are recommended.

Model	Screw (4 Req'd)	Torque		Lock washer (4 Req'd)
		lb. ft.	N.m	
C*-06	1036	11-15	14.9-20.3	68907
C*-10	1076	35-43	47.5-58.3	68909

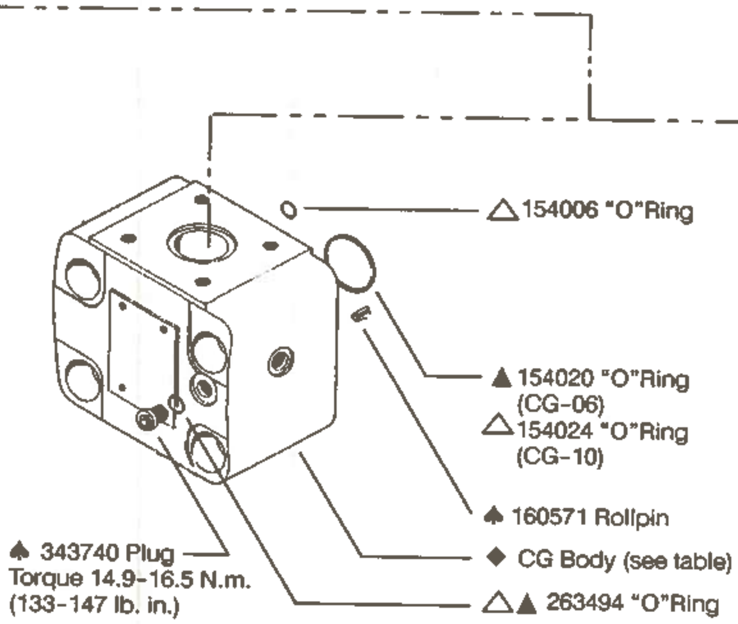
Sectional "E" vent head 1 or 3



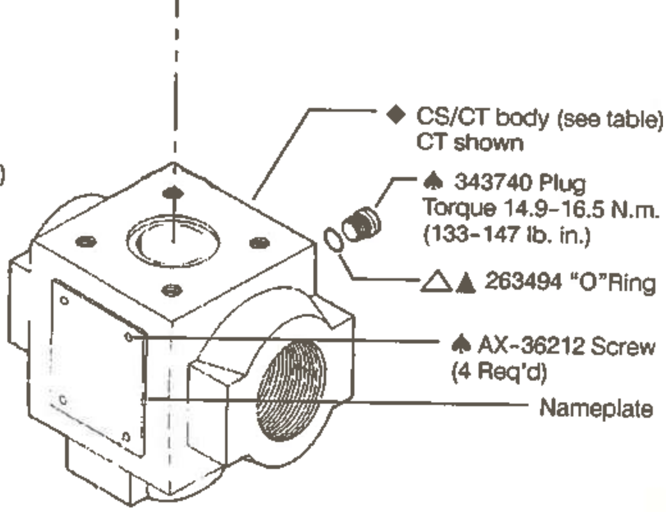
Model	Cover spring	Pressure range psi (bar)
C*-**-B	2280	125-1000 (8.5-70)
C*-**-C	583937	500-2000 (35-140)
C*-**-F	2281	1500-3000 (105-210)

♠ Part	Kit
1485	944064
AX-36212	944053
64520	944068
113000	944055
160571	944069
218750	944070
226816	944071
227405	944074
292230	944072
326317	944073
329463	944041
343740	944038

Parts with ♠ available only in kits of 25. Reference kit on parts order.



Model	◆ Body	
	-06	-10
CG	580456	581703
CS	581701	580430
CT	590348	590300



▲ Included in -06 F3 seal kit 919684

△ Included in -10 F3 seal kit 919685

● Included in CT-06-BC cover kit 942155

○ Included in CT-10-BC cover kit 942156

♠ Available only in kits of 25.

◆ Not available for sale

Model Code

(F3)–C* **–**(*)(V)–DG–**(L)**–(V)M–(S*)–*–**–*–*(L)–** *–***–**–EN**

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

1 Seals for mineral oil & fire resistant fluids

2 Relief valve connections

G – Subplate mounting
S – Straight threads
T – NPTF threads

3 Valve size

06 – 3/4"
10 – 1-1/4"

4 Pressure range

B – 125–1000 psi
C – 500–2000 psi
F – 1500–3000 psi
E – Vent

5 High vent

Blank – Omit for low vent models

6 Directional valve

7 Spool type & spring arrangement

0A(L) – Spring offset

8 Left hand build
Omit for standard models

9 Manual override options (Included in pilot valve model code)

Blank – Plain override solenoid ends only
H – Waterproof override solenoid ends only
H2 – Waterproof override both ends of single solenoid
M – Serviceable manual overrides in solenoid ends only
P2 – Plain override both ends of single solenoid
Y – Lockable manual overrides solenoid ends only
Z – No overrides in either end

10 Solenoid energization identity

Blank – Standard arrangement for ANSI B93.9 (energise solenoid A for flow P to A port)
V – Solenoid identification determined by position of solenoid. (Solenoid A at port A end and/or solenoid B at port B end. (All 4 & 8 spools are always V code)

11 Flag symbol heading electrical options & features

12 Spool position monitoring switch (tank pressure rating 10 bar only)

S1 – Switch, normally open, U coils only
S2 – Switch, normally closed, U coils only
S3 – Switch, wired normally open, P*
S4 – Switch, wired normally closed, P*
S5 – Switch, free leads, FW & FJ only
Omit if not required

13 Coil type

U – ISO 4400
P – Plug in coil
F – Flying lead
SP1 – Single 6,3 series spade to IEC 760
SP2 – Dual 6,3 series spade to IEC 760

14 Electrical connections (F type coil only) omit if not required

T – Wired terminal block
PA – Instaplug male receptacle only
PB – Instaplug male & female receptacle
PA3 – Three pin connector & terminal block
PA5 – Five pin connector & terminal block

15 Housing (F type coils only)

W – 1/2 NPT thread wiring housing
J – 20 mm thread wiring housing

16 Electrical options

1 – ISO with fitted plug, U type coils only
7 – Surge damper, P type coils only
9 – Rectifier (fast type) P type coils only
12 – Rectifier (slow type) P type coils only

17 Solenoid indicator lights (F build only) To be used with T terminal block models.
(Omit if not required)

18 Coil indentification

19 Pilot valve code (tank pressure rating)

2 – 10 bar (145 psi) use with switch models S*
5 – 100 bar (1450 psi) for all other models

20 Pilot valve port orifices

21 Design

40 – DG4V3S-60
Standard pilot valve
50 – DG4V3-60
High performance pilot valve

22 Special modifications (omit if not required)

7 Thru 20 Included in pilot valve model code

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Service Parts Information

BALANCED PISTON TYPE RELIEF VALVES

(F3)C*-10-*(V)(Y)-30

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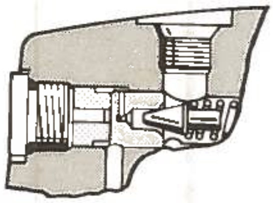
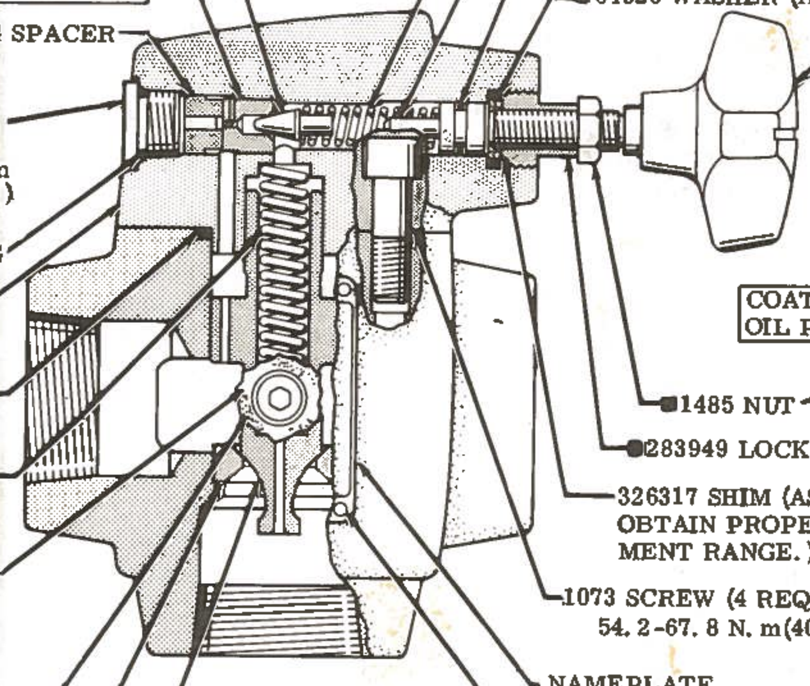


"Y" COVER ASSEMBLY (SEE TABLE)

MODEL	◆■ COVER	SPRING	■ SPRING	PRESSURE RANGE PSI	■INCLUDED IN COVER S/A
C*-10-B-30	581700	291822	2280	125-1000	941286
C*-10-BV-30		291821			
C*-10-BVY-30	590304				———
C*-10-BY-30		291822			
C*-10-C-30	581700		583937	500-2000	941287
C*-10-CV-30		291821			
C*-10-CVY-30	590304				———
C*-10-CY-30		291822			
C*-10-F-30	581700		2281	1500-3000	941288
C*-10-FV-30		291821			
C*-10-FVY-30	590304				926596
C*-10-FY-30		291822			

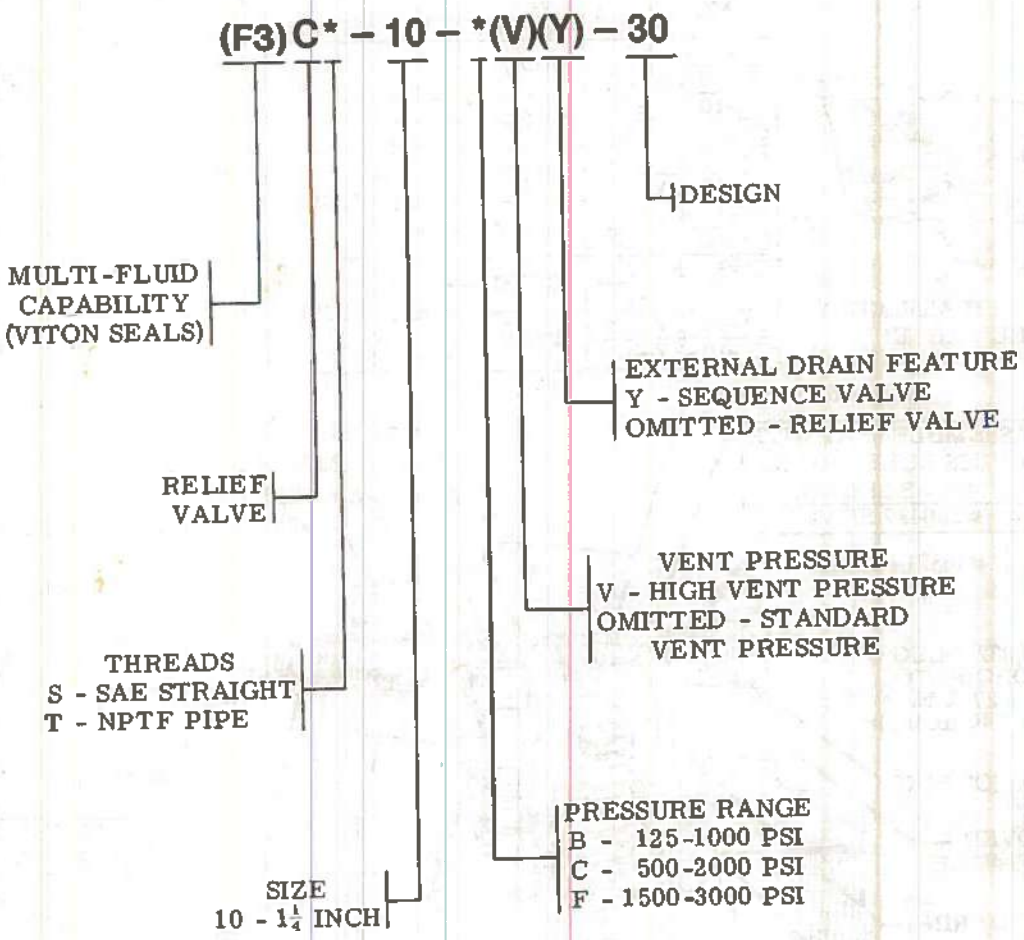


MODEL	◆BODY
CS-10-*(V)(Y)-30	580430
CT-10-*(V)(Y)-30	590300

▲INCLUDED IN F3 SEAL KIT 920225

◆NOT AVAILABLE FOR SALE AS INDIVIDUAL PARTS

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

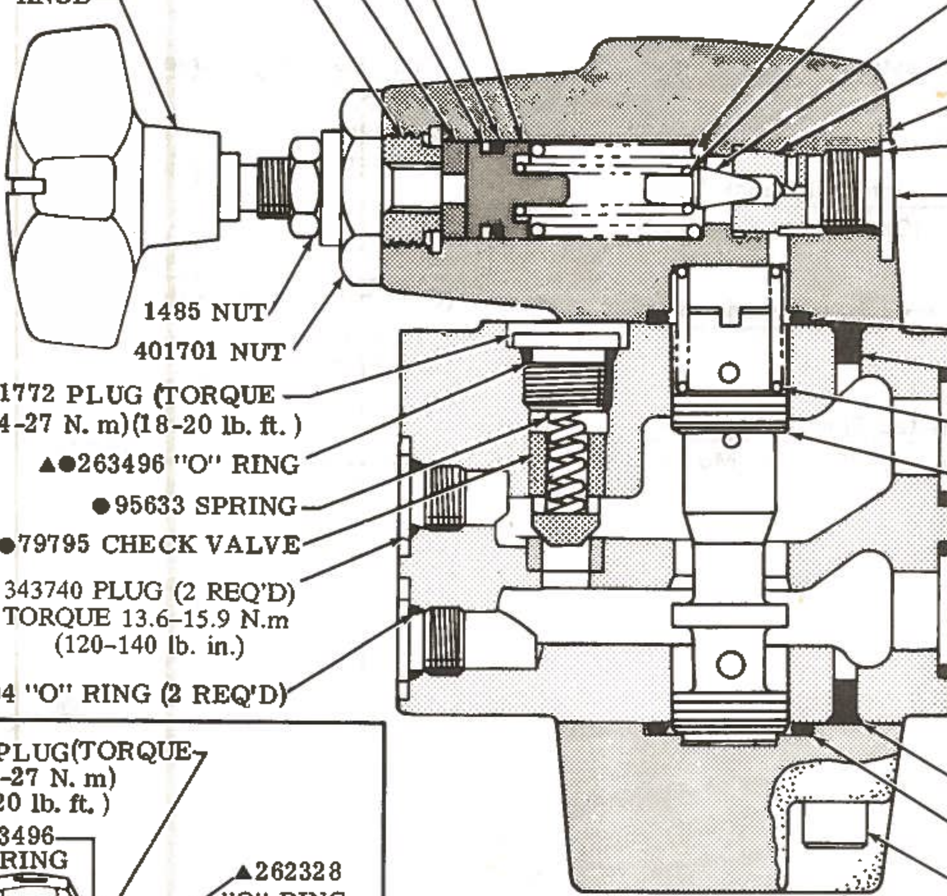
Service Parts Information

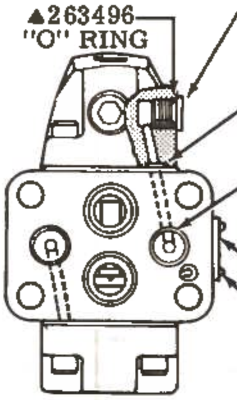
X(C)G-(H)03--30**

PRESSURE REDUCING VALVES

VICKERS® A TRINOVA COMPANY

MODEL	SPOOL S/A	MAIN SPRING
X*G-03-*B-30	428816	428817
X*G-03-*F-30	428816	428818
X*G-H03-*-30	590345	587247





●XC* MODELS ONLY

◆NOT AVAILABLE FOR SALE

▲SERVICE ALL UNITS W/F3 SEAL KIT 919836

⊖INSTALL LOCKSCREW WITH STEPPED O.D. END TOWARD SPACER OR PLUNGER AS SHOWN.

MODEL	COVER SPRING	SPACER	MAXIMUM P.S.I.
X*G-(H)03-1-30	2280	—	1000
X*G-(H)03-2-30	583937		2000
X*G-(H)03-3-30	401700	386715	2850

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1401 Crooks Road
Troy, Michigan 48084

MODEL CODE BREAKDOWN

(F3) - X (C) G - (H) 03 - * * - 30

1 2 3 4 5 6 7 8 9

1 — Seals For Mineral Oil & Fire Resistant Fluids

2 — Pressure Reducing Valve

3 — Integral Check Valve
(Omit if not Required)

4 — Manifold or Subplate Mounted

5 — Rated Flow - 30 USGPM
(Omit for 'B' & 'F' Models)

6 — Nominal Valve Size - 3/8 Inch

7 — Maximum Adjustable Pressure

1 - 1000 PSI
2 - 2000 PSI
3 - 2850 PSI

8 — Rated Flow
(Omit for High Flow 'H' Models)

B - 7 USGPM
F - 14 USGPM

9 — Design

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR, and OFRS series filters are recommended.

Litho in U.S.A.

Service Parts Information

VICKERS®
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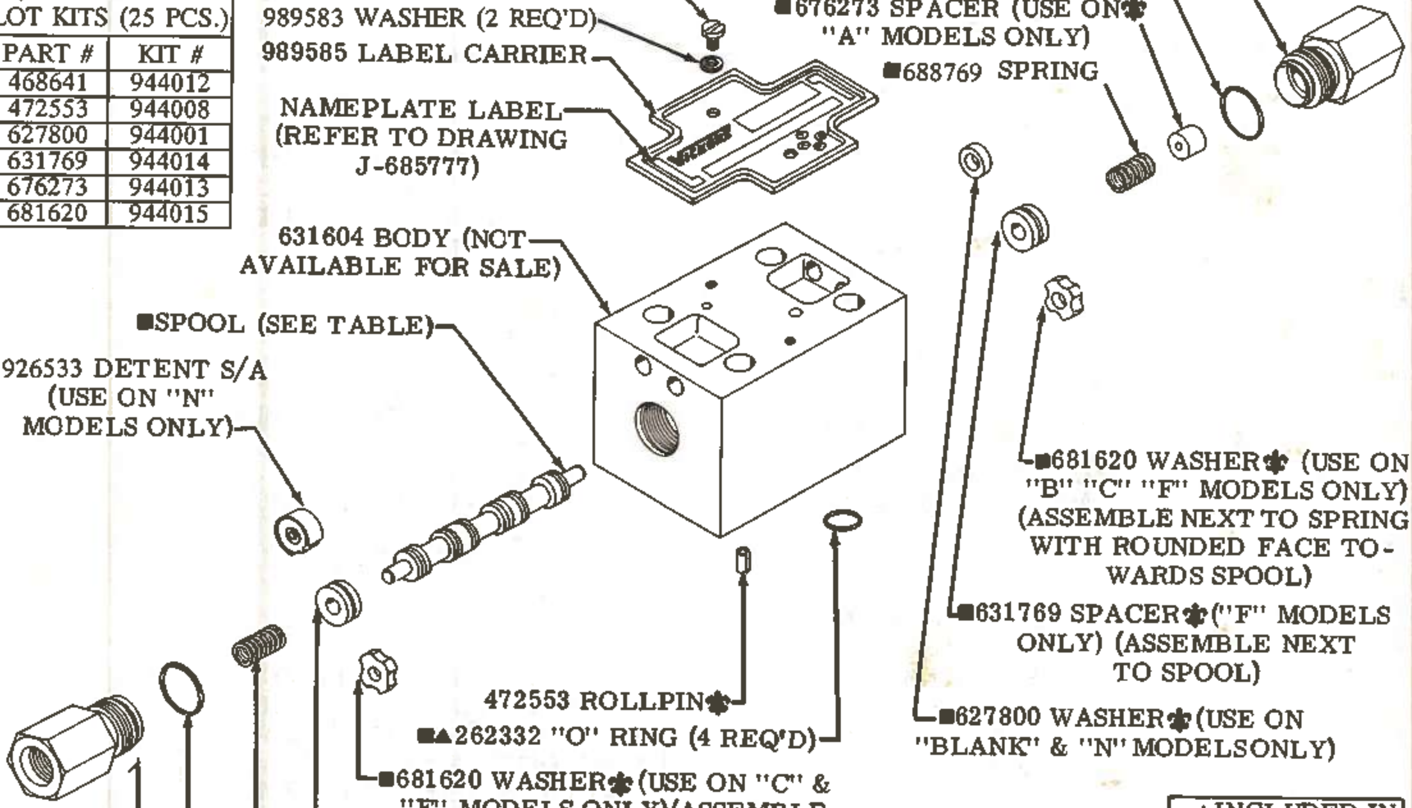
OIL PILOT OPERATED MINIATURE 4-WAY DIRECTIONAL VALVE

DG3V-3-**(L)-40

✽ AVAILABLE LOT KITS (25 PCS.)	
PART #	KIT #
468641	944012
472553	944008
627800	944001
631769	944014
676273	944013
681620	944015



▲INCLUDED IN 920332 SEAL KIT

■INCLUDED IN SPOOL KIT (SEE TABLE)

R. H. ASSEMBLY SHOWN, FOR ALL SINGLE OPERATOR MODELS. FOR L. H. ASSEMBLY, ALL PARTS ARE REVERSED EXCEPT BODY FOR "A" MODELS, OR BODY & SPOOL FOR "B" & "F" MODELS

PARTS PREFIXED WITH SYMBOL AVAILABLE ONLY IN KITS.

SPOOL TYPE	SPOOL	SPOOL KIT
OA	689675	926473
OC	587129	926474
2A	681614	926475
2C	587127	926476
2N	681614	926477
3C	590501	926589
6*	681615	926478
6A	681615	926479
6N	587130	926480

ASSEMBLE TYPE 3 SPOOL WITH NARROW CENTER LAND TOWARDS 'A' PORT.

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1401 Crooks Road
Troy, Michigan 48084

MODEL CODE BREAKDOWN

DG3V-3-(L)-40**

- **DG** – DIRECTIONAL CONTROL VALVE
- **G** – SUBPLATE OR MANIFOLD MOUNTED
- **3** – OIL PILOT OPERATED
- **V** – RATED PRESSURE 350 bar (5000 PSI)
- **3** – NFPA-D01 INTERFACE (ISO-4401-03)
- ***** (first) – SPOOL TYPE (CENTER CONDITION)
  - 0 - OPEN CENTER (ALL PORTS)
  - 2 - CLOSED CENTER (ALL PORTS)
  - 3 - CLOSED CENTER (P & B PORTS)
  - 6 - CLOSED CENTER (P PORT ONLY)
  - 33 - CLOSED CENTER (BLEED A & B PORT)
- ***** (second) – SPOOL/SPRING ARRANGEMENT
  - BLANK - NO SPRING
  - A - SPRING OFFSET TO PORT A
  - B - SPRING CENTERED, SINGLE OPERATOR
  - C. - SPRING CENTERED
  - F - SPRING OFFSET TO PORT A, SHIFT TO CENTER
  - N - NO SPRING DETENTED
- **(L)**
  - L - LEFT HAND ASSEMBLY (A, B, & F MODELS ONLY)
  - OMIT FOR STD. RIGHT HAND ASSEMBLY
- **40** – DESIGN

AS THIS COMPLETE UNIT CAN BE REPLACED AT A NOMINAL COST, FACTORY REPAIR IS NOT PRACTICAL. KITS ARE AVAILABLE TO SUPPORT CUSTOMER REPAIR.

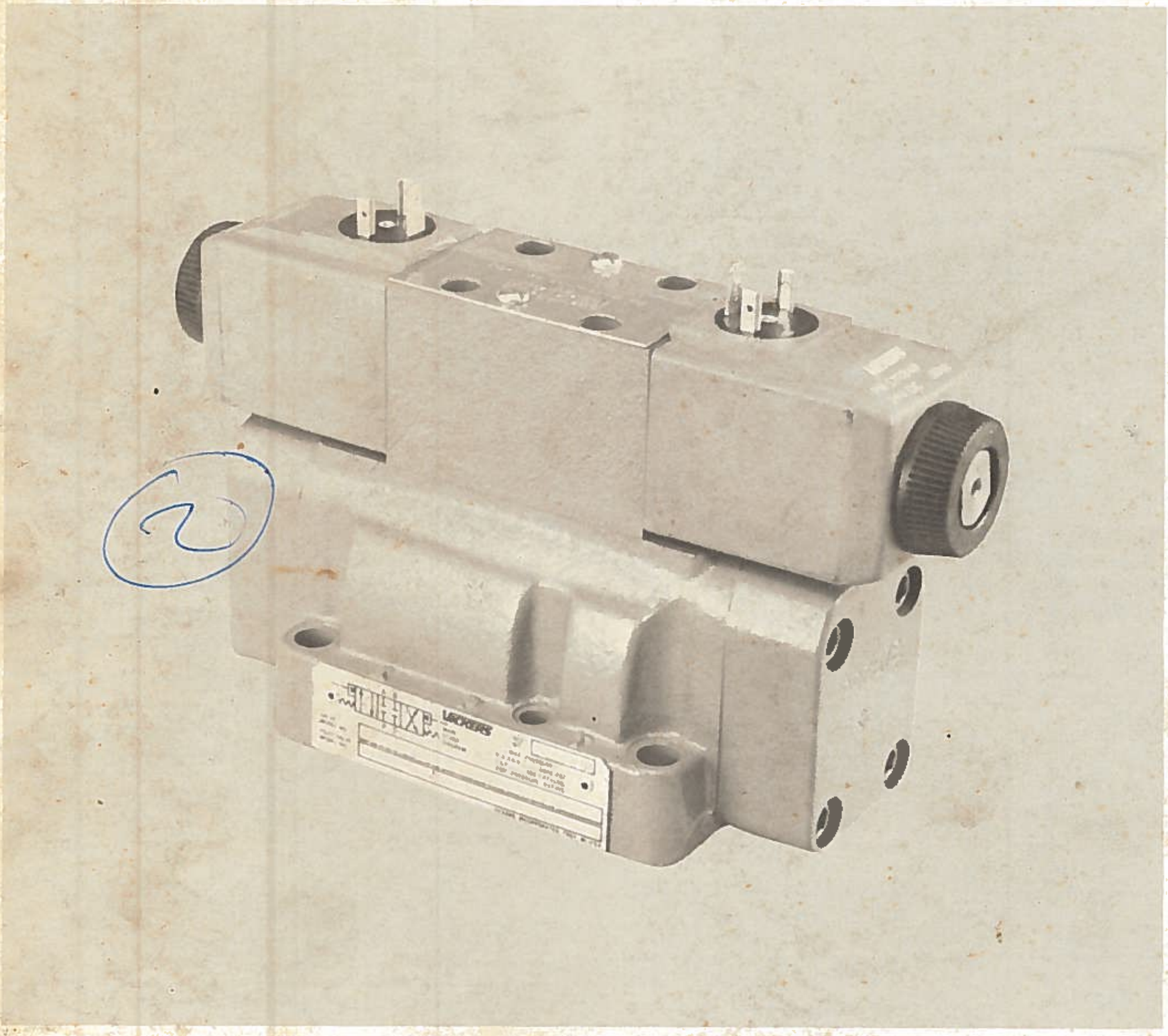
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

Litho in U. S. A.

Service Data

Solenoid Controlled Pilot Operated Directional Valves

(F3)DG5S4-04-**(L)(**)(X)(*)(E)(T)(*)-(V)M-(S*)*(**)**(L)**5-***-60/70



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Troy, Michigan 48007-0302
U.S.A.

Released 05-01-91

I-3891-S

MAIN STAGE SPOOL TYPE	AVAILABLE VALVE TYPE	SPOOL	MAIN STAGE ID PLATE	
			"A" ONLY	B/C/N
O	A/B/C/N	399891	433851	433852
1		*431972		433851
2		399892		433853
3		*399893		433854
4		413481		433855
6		399894		433856
8		399896		433855
9		413483		433852
11		*431972		433851
31		*399893		433851
33		399897		433856

* SPOOL ASSEMBLY NOTE

Assemble type 1 & 3 spools with narrow center land toward "A" end of valve. "A" end is defined as being closest to CYL. port "A". Type 11 & 31 spools are installed in reverse of type 1 & 3 with narrow center lands toward "B" end of valve.

■ PLUG TORQUES (OILED)

PLUG	N.M	lb. in.
7074	8.5-9.6	75-85
113000	5.0-5.9	45-52
367427	5.0-5.9	45-52

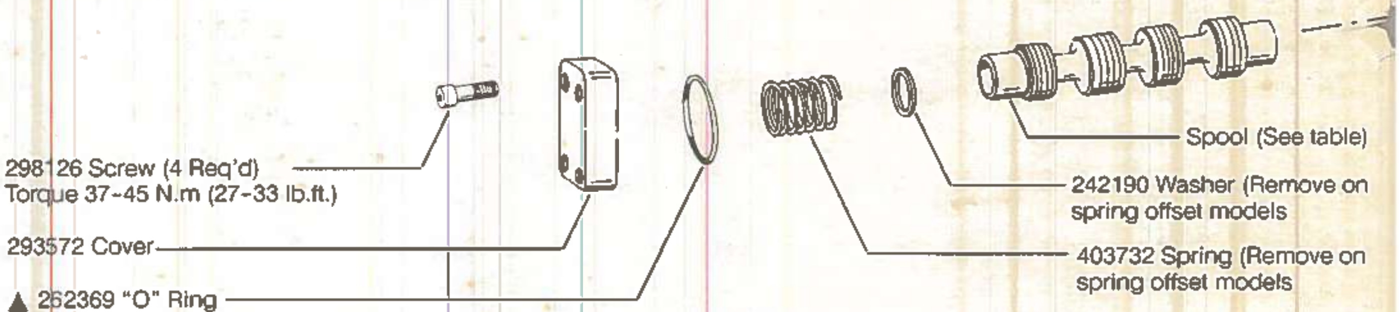
■ PLUG INSTALLATION TABLE

MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S4-04*	DOES NOT EXIST	367427	OUT
DG5S4-04*-E		113000	367427
DG5S4-04*-X		OUT	OUT
DG5S4-04*-X-E		113000	
DG5S4-04*-K/R/S	367427		
DG5S4-04*-E-K/R/S	113000		326427
DG5S4-04*-X-K/R/S	OUT		OUT
DG5S4-04*-X-E-K/R/S	113000		

★ 113000 SOLID PLUG ★ 367427 ORIFICE PLUG

NOTE

Parts included in service kits are not sold separately.



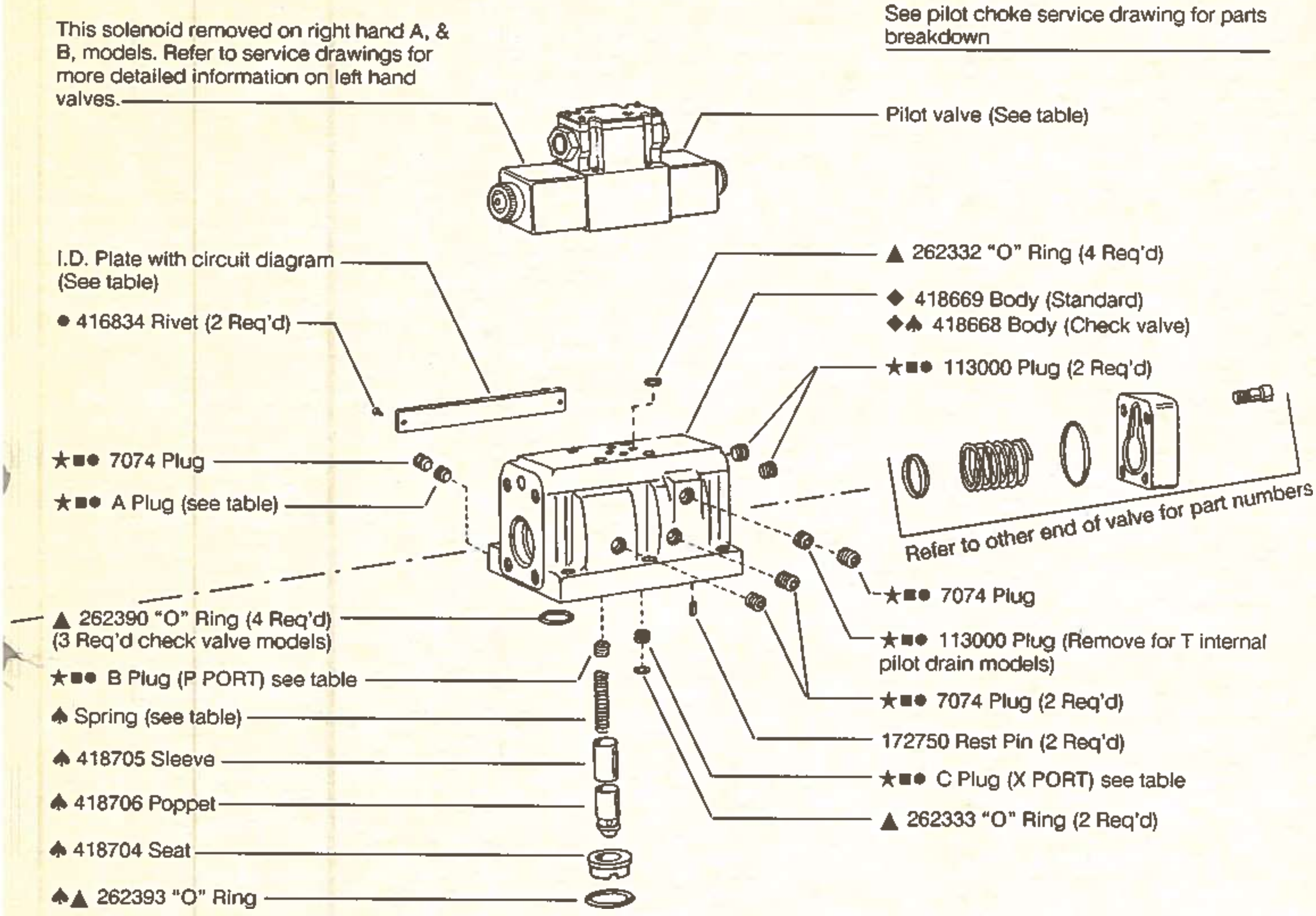
VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE
DG5S4-04*A	O, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3(S)-2A-60
	4 & 8	DG4V-3(S)-28A-60
DG5S4-04*B	O, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3(S)-6B-60
	4 & 8	DG4V-3(S)-68B-60
DG5S4-04*C	O, 1, 2, 3, 6, 9, 11, 31, 33, 52, 521	DG4V-3(S)-6C-60
	4 & 8	DG4V-3(S)-68C-60
DG5S4-04*N	O, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3(S)-6N-60
	4 & 8	DG4V-3(S)-68N-60

See pilot valve service drawing for parts breakdown

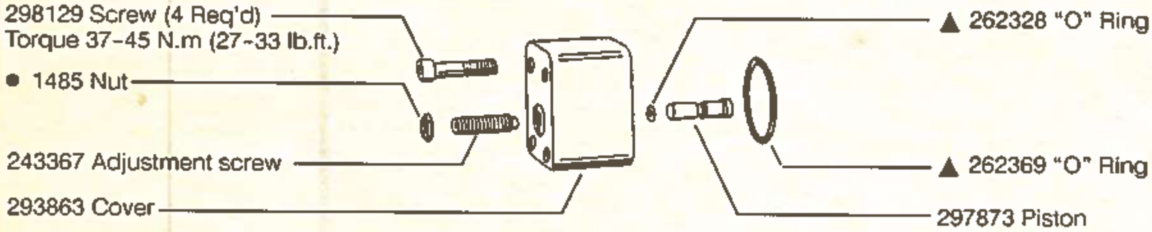
▲ Included In F3 Seal Kit 696897
★ Included In Plug Kit 926545
◆ Not Available For Sale
♠ Used On Check Valve Models Only
■ Plug Torques (See Table)
● Available Only In Kit Of 25 Each

MODEL	♠ SPRING
DG5S4-04-K	426859
DG5S4-04-R	418675
DG5S4-04-S	432350

PILOT STAGE BOLT KIT (INCLUDES 4 ATTACHING BOLTS)	
MODEL	BOLT KIT
W/O Pilot choke	696899
W/ Pilot choke	696900
Torque 4.5-5.7 N. m. (39.8-50.4 lb. in.)	
See pilot choke service drawing for parts breakdown	



Parts shown included in 941029 stroke adjustment kit. Order two kits if stroke adjustment is required for both ends.



Stroke adjustment parts either end or both

NOTE

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner.

Model Code

(F3)DG5S4-04-* * (L)(**)(X)(*)(E)(T)(*)-(V)M-(S*)*(**)* *(L)** *-***-60/70

1 (F3) · 2 DG5S · 3 4-04 · 4 * · 5 * · 6 (L) · 7 (**) · 8 (X) · 9 (*) · 10 (E) · 11 (T) · 12 (*) · 13 (V) · 14 M · 15 (S*) · 16 * · 17 (**) · 18 * · 19 * · 20 (L) · 21 ** · 22 * · 23 *** · 24 60/70

1 Seals for mineral oil & fire resistant fluids

2 Directional control valve
Manifold or subplate mounted
Solenoid controlled
Pilot operated
Rated pressure 210 bar (3000 psi)

3 Interface

04 – NFPA-D04 (ISO-4401-07)

4 Spool type (see table)

5 Spool/Spring arrangement

A – Spring offset, to CYL. A
B – Spring centered, sol. A removed
C – Spring centered
F – Spring offset, to CYL. A shift to center
N – No spring detented

6 Left hand

L – Left hand (single solenoid only)
Blank – Omit when not required

7 Manual override option

Blank – Plain override solenoid ends only
H – Waterproof override solenoid ends only
H2 – Waterproof override both ends of single solenoid
P2 – Plain override both ends of single solenoid
Y – Lockable manual overrides solenoid ends only/DC only
Z – No overrides in either end

8 Response type

X – Fast response
Blank – Standard low shock models

9 Spool control modifications

1 – Stroke adjustment
2 – Pilot choke adjustment
3 – Pilot choke & stroke adjustment
7 – Stroke adjustment CYL. A only
8 – Stroke adjustment CYL. B only
2 -7 – Dual pilot choke & stroke ADJ. A port end only
2 -8 – Dual pilot choke & stroke ADJ. B port end only
Blank – Omit when not required

10 Pilot pressure

E – External pilot pressure
Omit – Internal pilot pressure

11 Pilot drain

T – Internal pilot Drain
Omit – External pilot drain

12 Pressure port check valve

K – 0.35 bar (5 psi cracking pressure
R – 3.45 bar (50 psi cracking pressure
S – 5.20 bar (75 psi cracking pressure
Blank – Omit when not required

13 Solenoid energization identity

Blank – Standard arrangement for ANSI B93.9 (energ se solenoid A for flow P to A port)
V – Solenoid identification determined by position of solenoid. (Solenoid A at port A end and/or solenoid B at port B end.
(All 4 & 8 spools are always V code)

14 Flag symbol heading electrical options & features

15 Spool indicator switch
Available on high performance models, DG4V-3, only.
Omit when not required.

S1 – Options available on U only)
S2 – Options available on U only)
S3 – Options available on P* only
S4 – Options available on P* only
S5 – Options available on FW/FJ only

16 Coil type

U – ISO 4400
F – Flying lead
SP1 – Single 6,3 MM spade to IEC 760
SP2 – Dual 6,3 MM spade to IEC 760

17 Electrical connections (F type coil only) omit if not required

T – Wired terminal block
PA – Instaplug male receptacle only
PB – Instaplug male & female receptacle
PA3 – Three pin connector
PA5 – Five pin connector

18 Housing (F type coils only)

W – 1/2 NPT thread wiring housing
J – 20 mm thread wiring housing

19 Electrical options

1 – ISO with fitted plug, U type coils only
6 – ISO with fitted plug, & lights U type coils only

20 Solenoid indicator lights (F build only) used with T terminal block models. (Omit if not required)

21 Coil indentification

22 Pilot valve code (tank pressure rating)

2 – 10 bar (145 psi) DG4V3-60
5 – 100 bar (1450 psi) DG4V3S-60
6 – 160 bar (2285 psi) DG4V3-60
7 – 210 bar (3000 psi) DG4V3-60

23 Pilot valve port orifices

24 Design

60 – DG4V3S-60 pilot valve
70 – DG4V3-60 pilot valve

6 Thru **23** included in pilot valve model code

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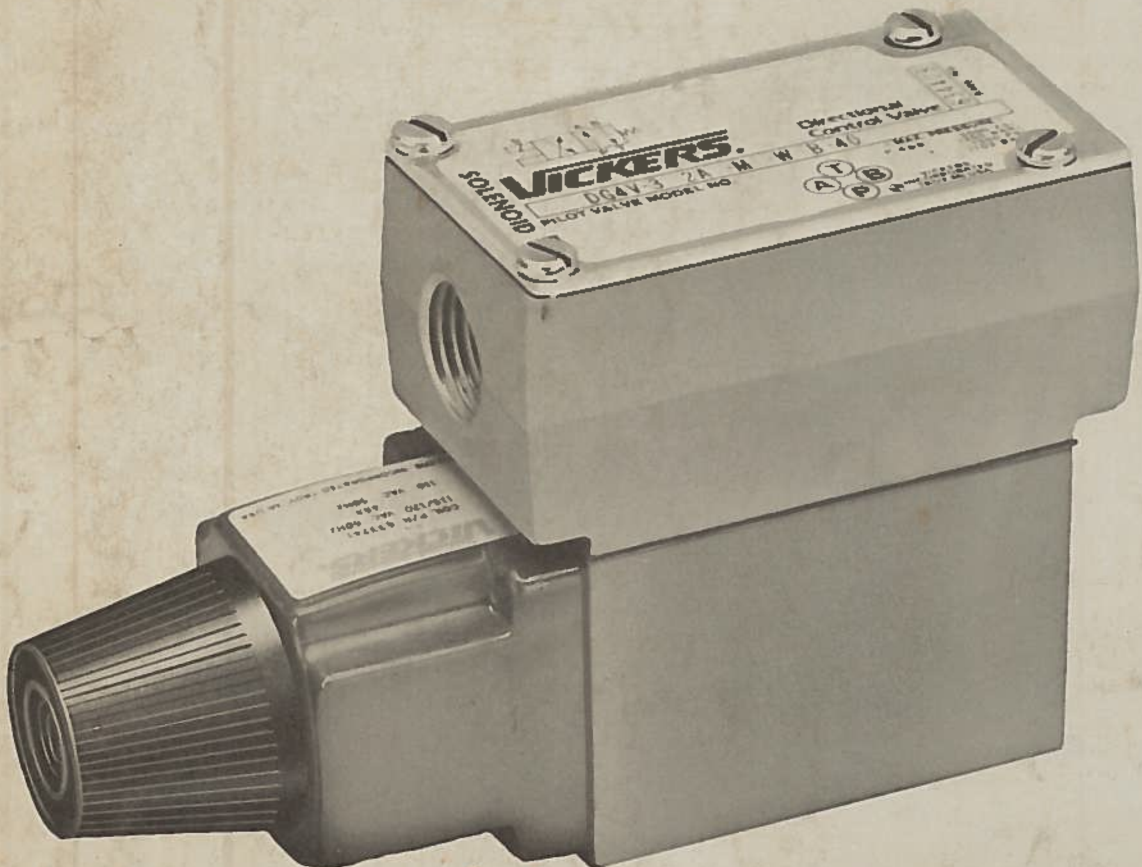
Service Parts Information

Solenoid Operated Directional Valve

DG4V-3-*A-M(P**)-**-*-40 Spring Offset



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 8-1-86

I-3861-S

127

DIN 43650 COIL S/A	COIL S/A	AC VOLT Hz	DC VOLT	COIL CODE
635061	633741	110/50, 115/60, 120/60	—	B
683312	989721	110/50, 115/60, 120/60		*B-9
635062	633742	220/50, 230/60, 240/60		D
683218	989764	24/50, 24/60		N
683310	683053	100/50, 100/60		T
681611	681404	—	32	DK
681423	989654		12	G
681610	989656		24	H
682552	682550		48	J

*B-9 REDUCED POWER CONSUMPTION COIL

SPOOL TYPE	SPOOL	■SPOOL KIT
0A	989594	926350
2/28A	631615	926351
6A	989595	926352
7A	989596	926353
22A	989649	926354

SPOOL KIT ALSO INCLUDES PARTS PREFIXED WITH ▲ AND ■.

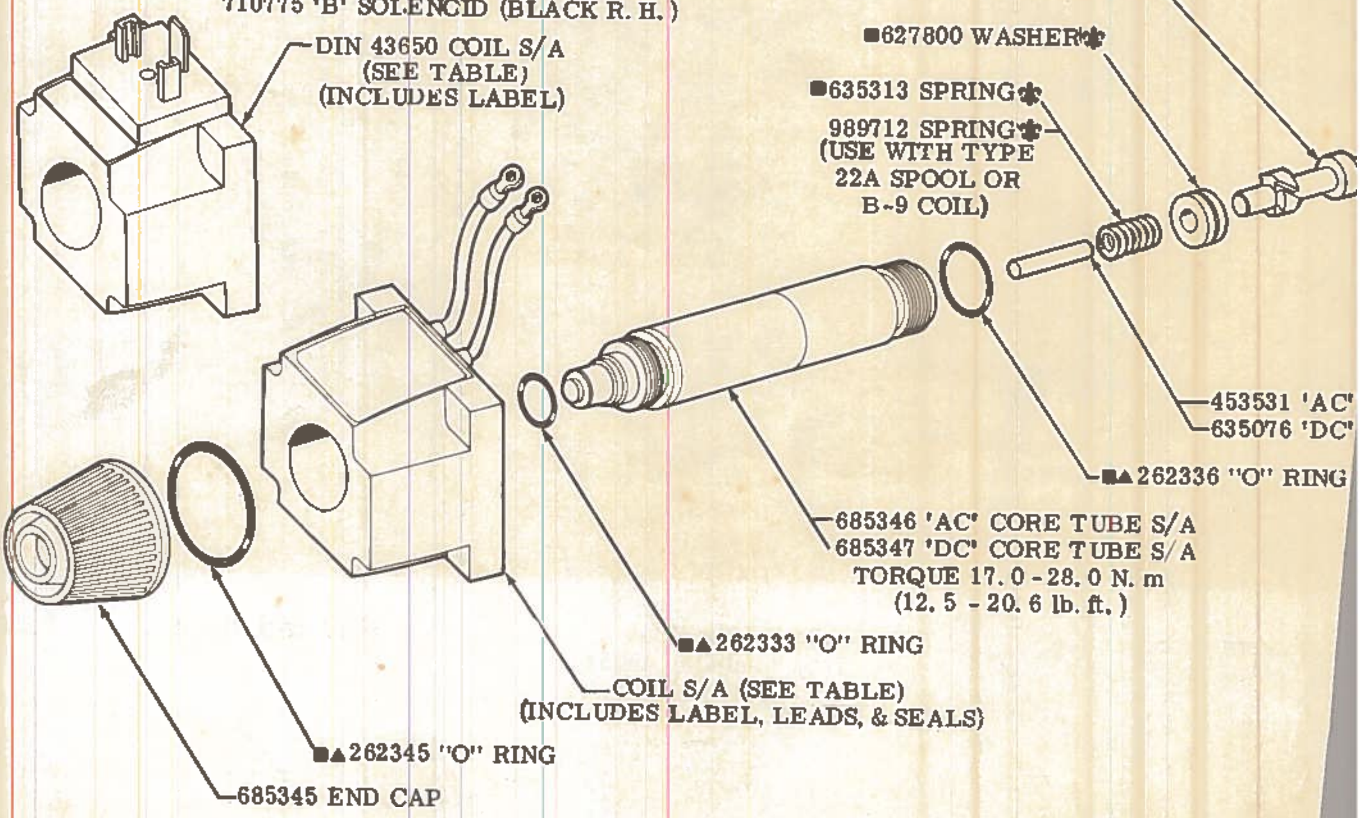
REFER TO I-3866-S FOR ELECTRICAL FEATURES AND OPTIONS

▲INCLUDED IN F3 SEAL KIT 920304
◆INCLUDED IN FASTENER KIT 926433
⊖INCLUDED IN MANUAL OVERRIDE KIT 926462
✽AVAILABLE ONLY IN KITS OF 25
●OMIT WHEN USING DIN 43650 COILS

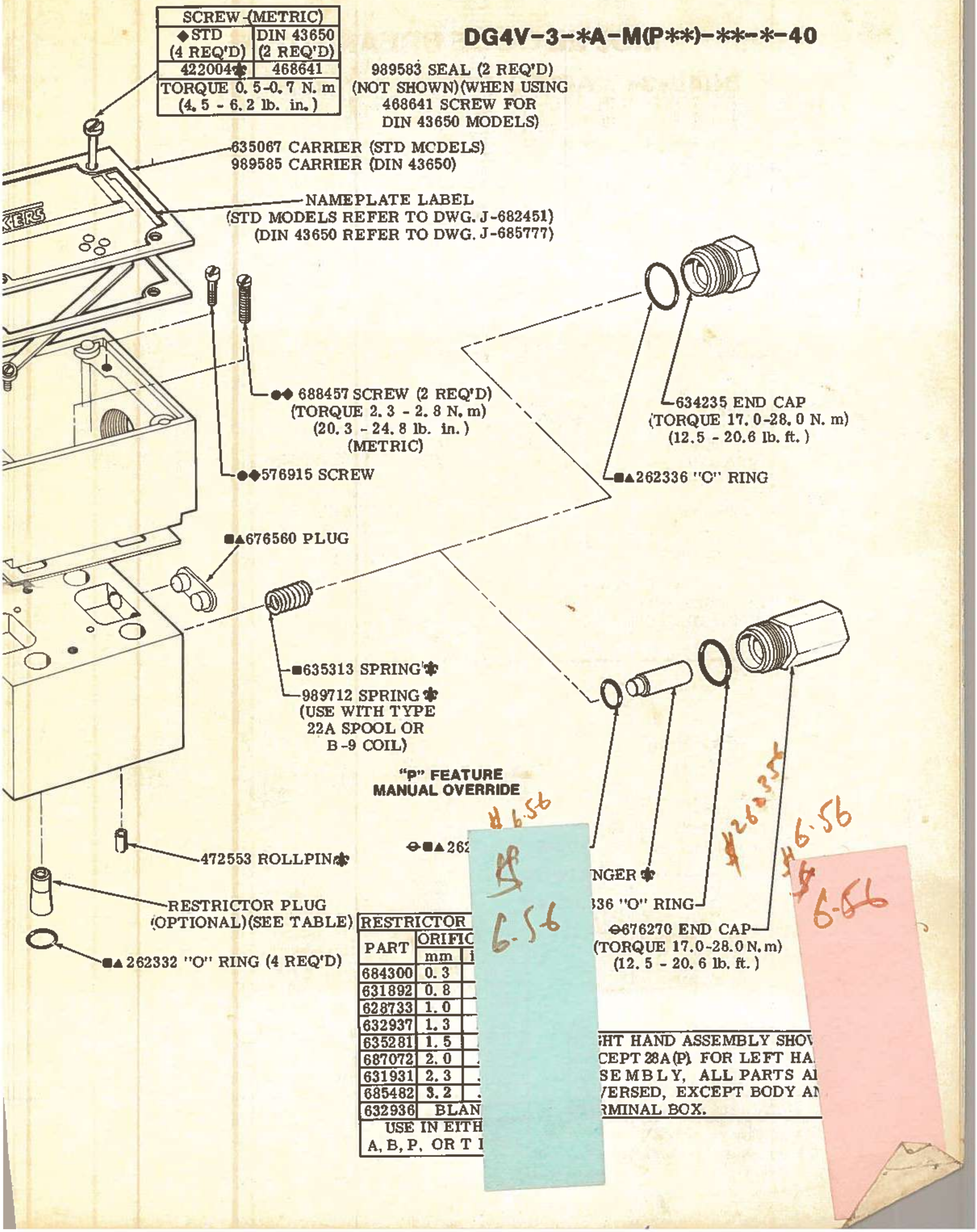
-A SPOOL DESIGNATION OF 28A INDICATES VALVE IS USED AS A PILOT FOR TWO STAGE VALVES WITH 4 OR 8 TYPE MAIN STAGE SPOOLS. REFER TO DWGS. J-682451 & J-685777 FOR NAMEPLATE.

PARTS WITH SYMBOLS AVAILABLE ONLY IN KITS

-ASSEMBLE TYPE 0A SPOOL WITH LONGER SPOOL END TOWARDS SOLENOID.
-ASSEMBLE TYPE 7A SPOOL WITH REDUCED AND UNSLOTTED END DIA. TOWARDS SOLENOID.



DG4V-3-*A-M(P**)-**-*-40



RESTRICTOR		
PART	ORIFIC...	
	mm	i...
684300	0.3	
631892	0.8	
628733	1.0	
632937	1.3	
635281	1.5	
687072	2.0	
631931	2.3	
685482	3.2	
632936	BLAN...	
USE IN EITH... A, B, P, OR T I...		

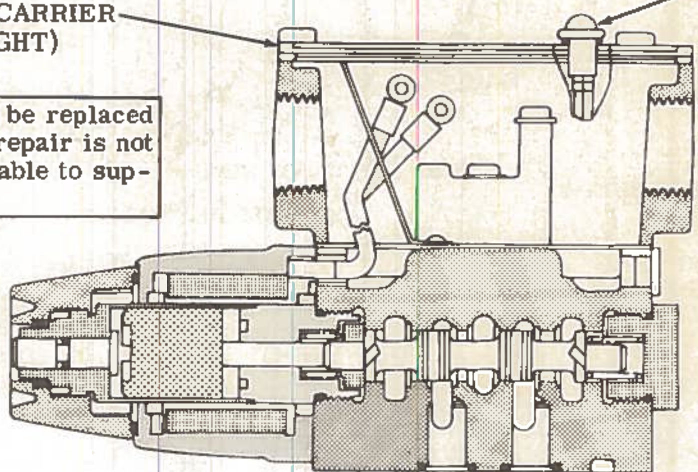
...GHT HAND ASSEMBLY SHOW... ...CEPT 28A(P). FOR LEFT HA... ...SEMBLY, ALL PARTS A... ...VERSED, EXCEPT BODY AN... ...RMINAL BOX.

MODEL CODE BREAKDOWN

DG4V-3- * A(P)(L)-M(P**)-**-*-(9)-(***)-40

- **D** – DIRECTIONAL VALVE
- **G** – SUBPLATE OR MANIFOLD MOUNTED
- **4** – SOLENOID OPERATED
- **V** – MAXIMUM PRESSURE RATING 350 bar (5000 PSI)
- **3** – INTERFACE NFPA-D01/ ISO-4401-3
- ***** – SPOOL TYPE
- **A** – A - SPRING OFFSET TO 'A' PORT
- **(P)** – MANUAL OVERRIDE (OMIT WHEN NOT REQUIRED)
- **(L)** – LEFT HAND (OMIT WHEN NOT REQ'D)
- **M** – FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS
- **(P**)** – ELECTRICAL FEATURES (REFER TO DWG. I-3866-S)
- ****** – U - DIN 43650 COIL; W - WIRING HOUSING $\frac{1}{2}$ NPT THD.; WL - WIRING HOUSING $\frac{1}{2}$ NPT THD. (WITH INDICATOR LIGHT)
- ***** – COIL CODE LETTER (SEE TABLE FOR VOLTAGE AND FREQUENCY)
- **(9)** – LOW WATTAGE COIL (B COIL ONLY)
- **(***)** – RESTRICTOR PLUG (A, B, P, OR T PORT) (SEE TABLE FOR ORIFICE DIA. SIZES)
- **40** – DESIGN

635065 CARRIER (LIGHT)



LIGHT KIT	VOLTAGE RANGE
926499	12V AC/DC
926431	24V AC/DC
926432	115V AC/DC
926458	230V AC/DC

LIGHT KITS INCLUDE TWO LIGHTS

As this complete unit can be replaced at a nominal cost, factory repair is not practical. Kits are available to support customer repair.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U S. A

VICKERS

Power Plugs for Proportional Valves (12 volt supply)

EHH-AMP-712-D/E-1* series
EHH-AMP-712-G/H-1* series

For use with valve types:
KDG4V-3-**C***-*-(V)M-U-GP7-2*
KTG4V-3-**B***-*-(V)M-U-GP7-2*
KDG4V-5-**C***-*-(V)M-U-GP7-3*
KTG4V-3-**B***-*-(V)M-U-GP7-3*
KCG-3-***-D-Z-M-U-GP1-1*

1. General Description

These plugs, conforming to ISO 4400/DIN 43650 interface, offer low cost solutions for direct solenoid-operated, non-feedback hydraulic proportional valves through the use of an integral amplifier.

Adjustments of "gain", "ramp time" and "deadband" can be made directly at the plug. Two ranges of ramp time are offered.

The proportional plugs are controlled with 0-5V, or 0-10V command signal to give an output current (adjustable with the gain control) of up to 2,7A maximum.

Features and Benefits

- Integral amplifier provides essential functions for control of proportional valves
- Differential command signal option (types D and E)
- 8 volt reference option (types G and H)
- Adjustable ramp time
- Adjustable deadband compensation
- Adjustable gain
- Ease of installation with reduced cost
- Reduction of EMI radiation
- Fully short-circuit and reverse polarity protected

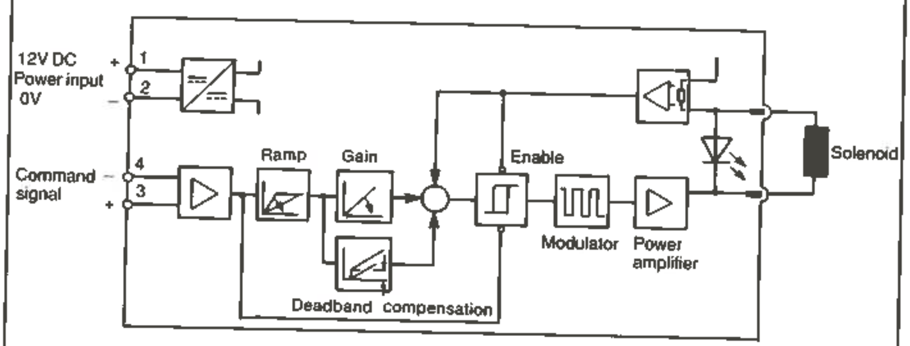
2. Application

Primary applications are the control of directly operated, non-feedback proportional valves where the cost of sophisticated electronic controls can be avoided.

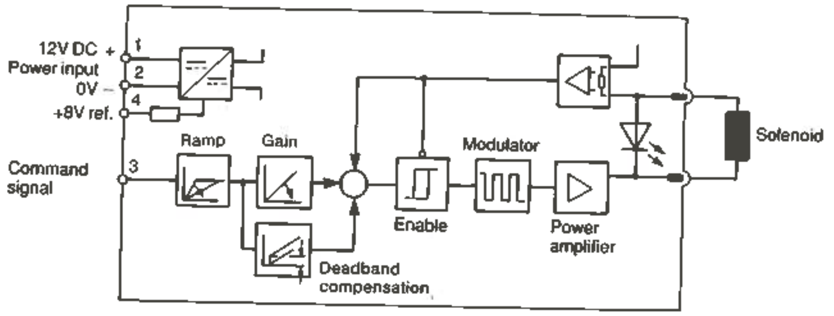
The combination of proportional valve and plug offers very low cost solutions to many hydraulic actuator control problems requiring smooth acceleration and deceleration.

3. Electrical Block Diagrams

EHH-AMP-712-D/E-1*



EHH-AMP-712-G/H-1*



July 1992

4. Model Codes

EHH-AMP - 712 - * - 1*

[1] [2]

[1] **Adjustment range**

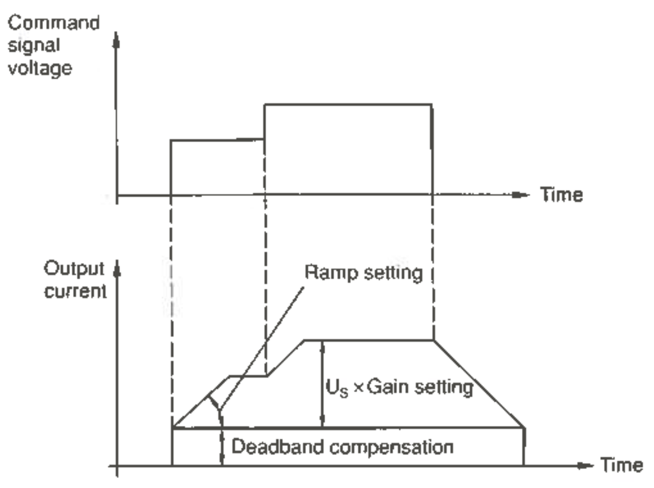
- D = 10V differential input: 600 ms maximum ramp time
- E = 10V differential input: 5s maximum ramp time
- G = 5V input: 600 ms maximum ramp time
- H = 5V input: 5s maximum ramp time

[2] **Design number, 1* series**
Subject to change. Installation dimension unaltered for design numbers 10 -19 inclusive.

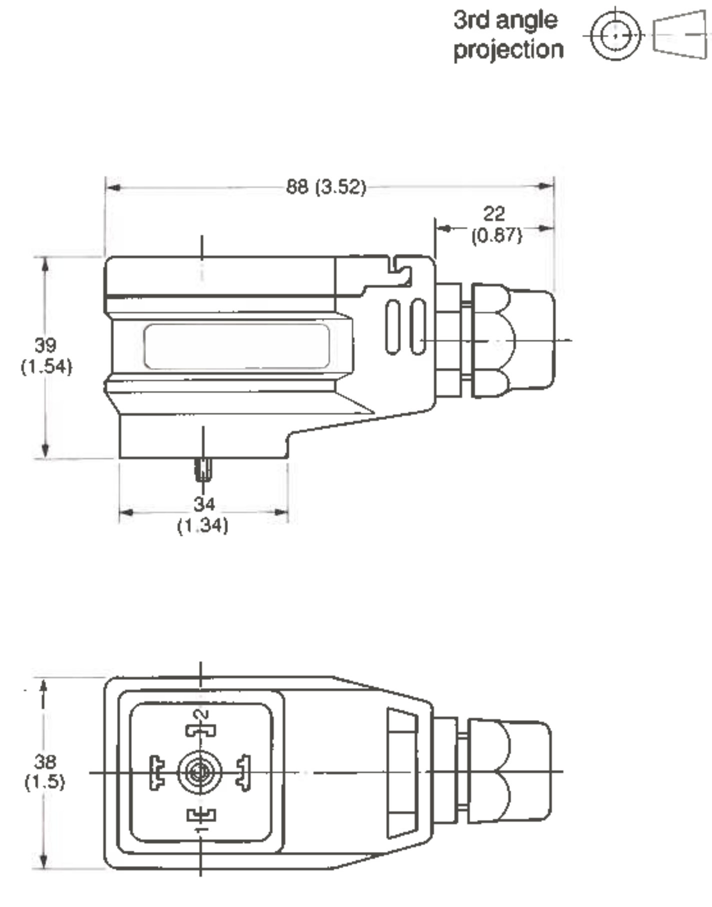
5. Operating Data

5.1 Electrical	
Power supply	9,5 - 16V DC, incl. ±10% max. ripple peak-to-peak
Protection	IEC529: IP65 (when correctly installed with interface seal in place). Fully short-circuit and reverse-polarity protected.
Output : Rated current Cut-off current Short circuit PWM frequency Load impedance	 2,7A 3A 0,1A rms typical 400 Hz typical ≤ 3Ω
Command signal: Types D and E: For no output For output Types G and H: For no output For output	 0 to 100 mV 200 mV to 10V 0 to 100 mV 200 mV to 5V
Command signal, absolute maximum for all types	70V
Reference voltage, types G and H Output impedance Minimum load impedance	+8V ±0,2V (open circuit) 1,3 kΩ 2,2 kΩ
Input impedance (signal): Types D and E Types G and H	 47 kΩ 94 kΩ
Ramp time adjustment range (potentiometer R1): Types D and G Types E and H	 50 to 600 ms 400 ms to 5s
Deadband compensation adjustment range (potentiometer R2)	0 to 1A
Deadband triggering voltage	200 mV
Gain adjustment range (potentiometer R3) Types D and E Types G and H	 0,075 A/V to 0,27 A/V 0,15 A/V to 0,54 A/V
5.2 Mechanical	
Housing	PA6 glass-reinforced plastic (conforming to UL-94HB) Color: gray
Mounting interface	ISO 4400 (DIN 43650)
Cable clamp	Pg9 screw type
Cable diameter	Ø 5 to 10 mm (0.197 to 0.394 dia)
Wire section	0,5 to 1,0 mm² (0.001 to 0.002 in²) (20 AWG-18 AWG)
Temperature, ambient range	0 to 50°C (+32 to 122°F)
Mass	0,07 kg (0.154 lb)

Input/output characteristics



6. Installation Dimensions in mm (inches)



7. Installation Data

Typical Installation Connections

EHH-AMP-712-D/E

Fig. 1

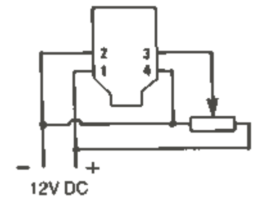


Fig. 2

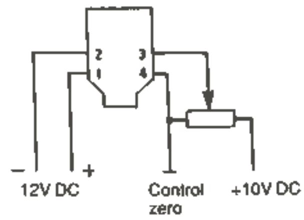


Fig. 3

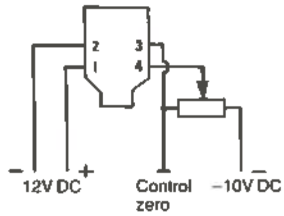
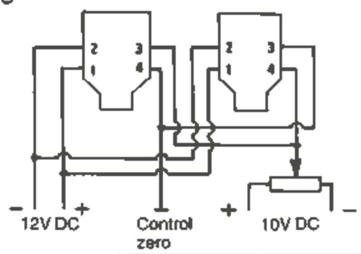


Fig. 4



Figs.1, 2, 3 show typical arrangements for single solenoid valves
Fig. 4 shows a typical arrangement for double solenoid valves

EHH-AMP-712-G/H

Fig. 5

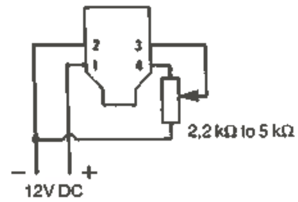
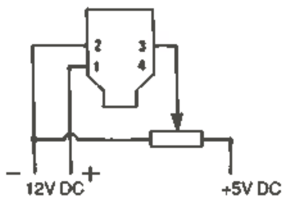


Fig. 6



Figs. 5 & 6 show typical arrangements for single solenoid valves

Wiring and Start-up Procedure

1. Correctly wire the plug (see inset drawing, this page) then, before mounting the plug onto the valve solenoid, apply 12V DC (9,5 to 16V limits) to the "power input" terminals.

2. Check for correct plug function by illumination/non-illumination of the LED:

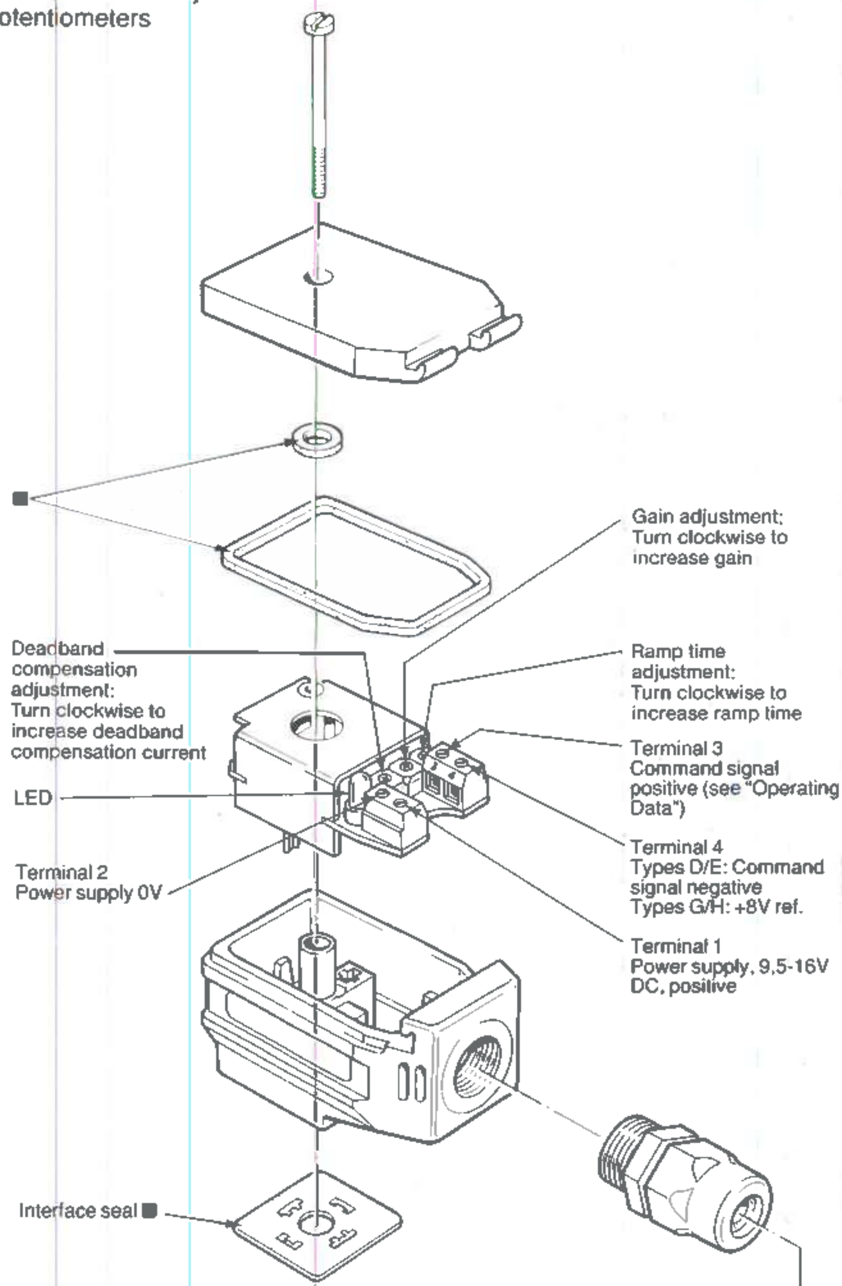
The LED should illuminate when the valve is exited, and should not be illuminated when the signal is less than 100 mV. If there is a malfunction then a new plug must be fitted.

3. Switch off power supply and command signal and then install the plug on the solenoid. Ensure that the seal is correctly fitted and clamped when the retaining bolt is tightened: *this is essential in providing IP65 protection.*

4. Ensure that the hydraulic system will not cause any erratic movement of actuators, then:
- Switch on power supply again
- Repeat LED/function check as in 2.
An LED malfunction now indicates a short circuit at the load.

5. Successful completion of these checks means that the plug and load are ready for use.

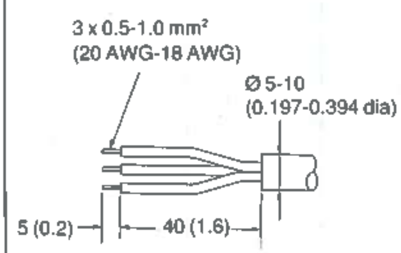
Assembly showing wiring connection points, LED and adjustment potentiometers



Warnings
- Ensure cable clamp nut is adequately tightened to secure the cable
- Do not install, or remove, the plug when power is on
- Do not connect, or disconnect, the wiring while power is on

■ *All seals must be fitted correctly at plug installation to provide protection to IP65 (IEC 529)*

Wiring preparation



8. Spare Parts

The only spare part available is the interface seal, part number 732100.

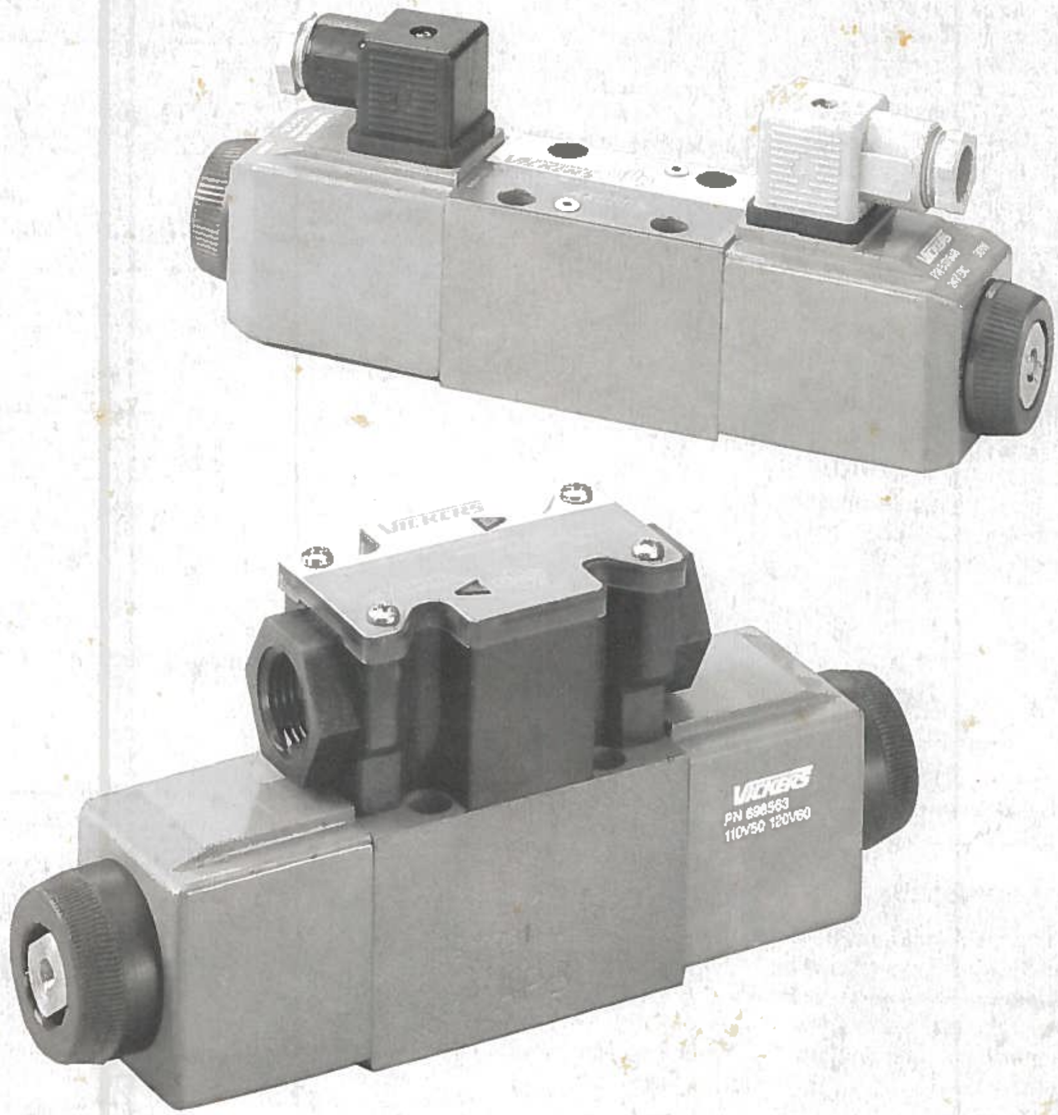
9. Ordering Procedure

Order plug by full model code, and spare interface seals by part number.

VICKERS

Solenoid Operated Directional Control Valves

DG4V-3 and DG4V-3S, 60 design
ISO 4401, size 03; ANSI/B93.7M-D03



September 1992

GB-C-2015B

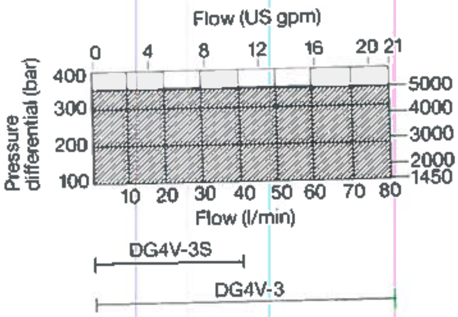
The DG4V-3 and DG4V-3S, 60 Design

- High and standard performance models
  - up to 80 l/min (21 US gpm) and up to 40 l/min (10.5 US gpm) at 350 bar (5075 psi).
  - builds on Vickers experience as the major supplier of size 03 valves world-wide.
  - offers designers the opportunity to select the optimum value package for each application.
- International standard interface. The valve mounting face conforms to ISO 4401, size 03 and is compatible with related international standards.

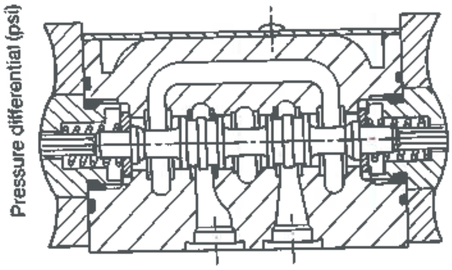
Application Benefits of the 60 Design

1. High pressure and flow capabilities, thanks to special design features

Highly reliable operation up to 80 l/min (21 US gpm) at 350 bar (5075 psi). Establishes new market standards and opens new possibilities to design engineers on valve size selection.

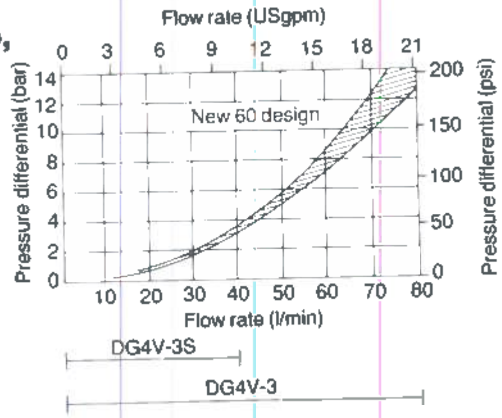


Typical max. pressure differential (P-A-B-T) flow envelope, blocked center spool.

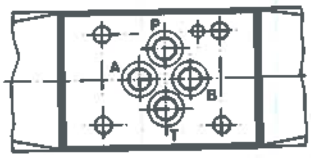


2. Minimal pressure drop, i.e. 2,5 bar (36 psi) at 30 l/min (7.9 US gpm)

Achieved by optimization of the valve body, spool and spool-stroke design. The results: low energy consumption and improved efficiency.



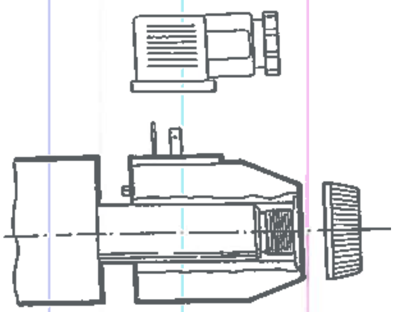
Typical single flow pressure differential for blocked center spool



Mounting surface to ISO 4401 size 03

3. Ease of servicing

Wet-armature solenoid, screw-in core tube design allows coils to be changed without removing valve from installation and without oil spillage or risk of contaminating system fluid.

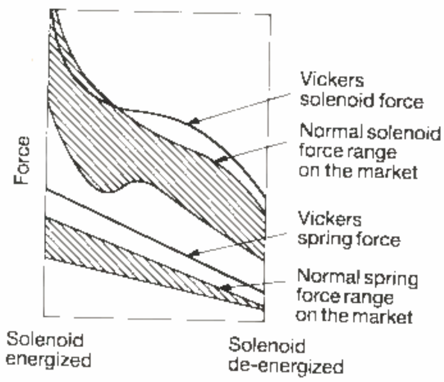


ISO 4400 (DIN43650) type coil illustrated.

4. High reliability

Design of spring forces and profile of DC solenoid force characteristics ensure spool position selection under extreme operating conditions. Result is a valve with high reliability when being energized or de-energized.

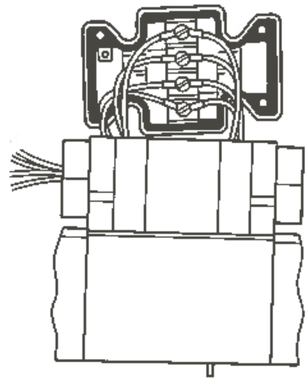
Performance leader



5. Electrical connections

9 catalogued coil electrical connection options including:

New conduit box design simplifies electrical wiring connections to solenoids. Orientation tabs prevent incorrect positioning.

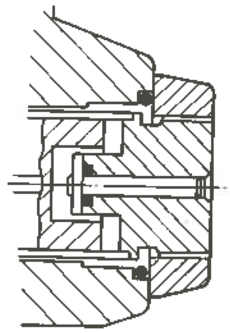


6. Scratch-proof manual override seal

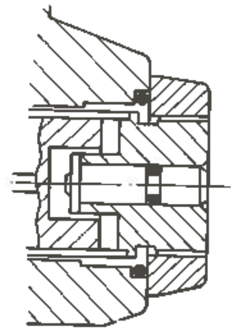
Internal seals are located such that they are beyond reach of any bore damage caused by small tools used to operate the manual override.

Result is no messy oil drips from the manual overrides.

Small diameter manual overrides prevent inadvertent operation.



DG4V-3S



DG4V-3

Wet-armature Solenoid Operated Directional Valves

High Performance DG4V-3, 60 Design
Standard Performance DG4V-3S, 60 Design

Mounting interface

ISO 4401 size 03
ANSI/B93.7M size D03
CETOP RP65H, size 3
DIN 24340, NG6

Basic characteristics

Max. pressure:
DG4V-3 .... 350 bar (5075 psi)
DG4V-3S .... 350 bar (5075 psi)
Maximum flow:
DG4V-3 .... up to 80 l/min (21 US gpm)
DG4V-3S .... up to 40 l/min (10.5 US gpm)

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   Response times 8
   Minimum voltage 8
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   Filtration requirements 9
5. Performance data:
   Max. flow rates:
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7. Mass 16
8. Electrical plugs and connectors 16
9. Installation data 19
10. Spare parts data 19
11. Ordering procedure 19

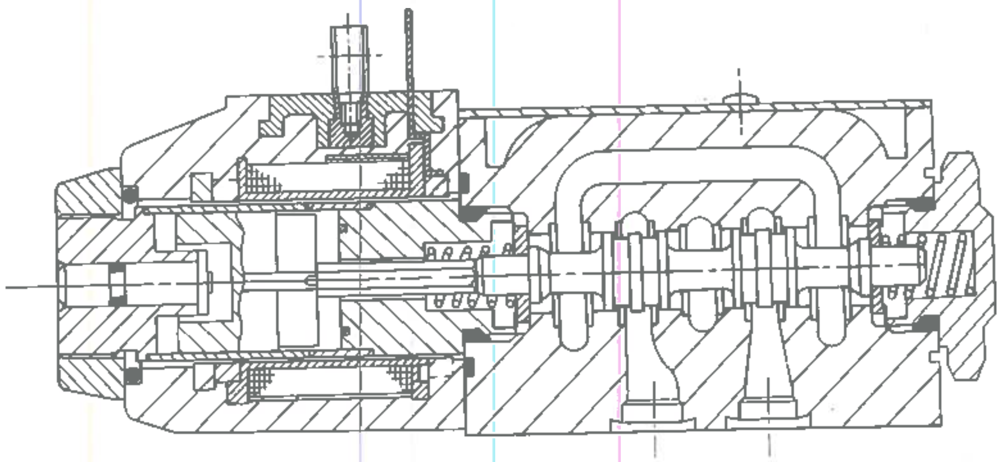
1. General Description and Application Benefits

Basically, these solenoid operated directional control valves are for directing and stopping flow at any point in a hydraulic system. However, this 60-design series has been specially designed and developed to cover all foreseen uses as well as the many traditional uses of the earlier designs. Some of the more important benefits to users are outlined.

In addition to new features and benefits described on pages 2 and 3, the DG4V-3 and DG4V-3S, 60 design, offer:

- Efficient control of greater hydraulic powers without increasing solenoid power consumption.
- Installed cost and space savings from higher power/weight-and-size ratios.
- Reduced internal leakage reduces power losses, increases system efficiency: the result of improved manufacture of spools and bores.
- Installation flexibility resulting from choice of numerous combinations of solenoid connectors and locations.
- Multi-fluid capability without need to change seals.
- Higher sustained machine productivity and higher uptime because of proven fatigue life and endurance, tested over 20 million cycles.
- Solenoid coils can be changed quickly and easily without leakage from hydraulic system.
- Compact, cost effective system design when used with Vickers SystemStak™ valves and multi-point subplates.

Construction of a typical single solenoid model

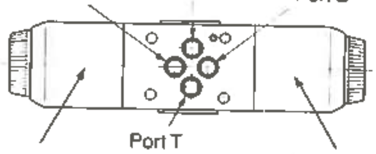


2. Functional Symbols

Spool types shown represent the highest proportion of market requirements. For other spool functions that may be required, consult your Vickers sales representative.

Solenoids Identified to US Convention

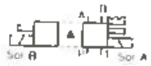
Functional symbols related to solenoid identity "A" and/or "B" according to NFPA/ANSI standards, i.e. energizing sol. "A" gives flow P to A, sol. "B" gives flow P to B (as applicable).



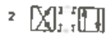
Sol.	For spool type	Sol.
B	All except "8"	A
A	"8" only ▼	B

▼ *For valves with type "8" spools, solenoid identity to US convention is the same as for European convention, see below for correct model code.*

Double solenoid valves, two position, detented

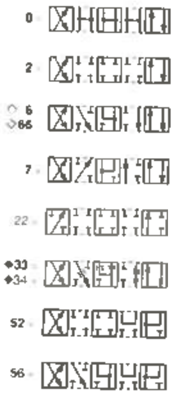


DG4V-3(S)-*N(-*) valves



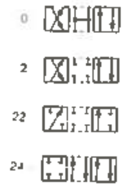
Double solenoid valves, spring centered

DG4V-3(S)-*C(-*) valves

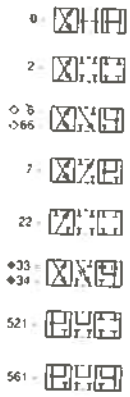


Single solenoid valves, solenoid at port A end

DG4V-3(S)-*A(-*) valves



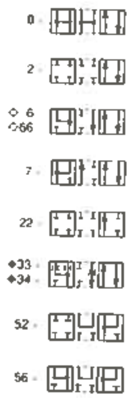
DG4V-3(S)-*B(-*) valves



Single solenoid valves, solenoid at port B end

DG4V-3(S)-*AL(-*) valves

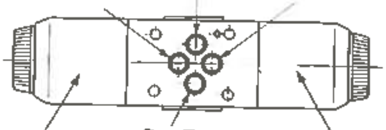
DG4V-3(S)-*BL(-*) valves



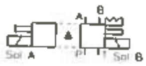
For solenoid identities of valves with type "8" spools see bottom panel of this page, and footnote above left.

Solenoids Identified to European Convention (Specify "V" in model code position 5)

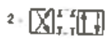
Functional symbols related to solenoid identity "A" and/or "B" according to European convention, i.e. sol. "A" adjacent to "A" port, sol. "B" adjacent to "B" port of valve.



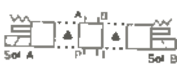
Double solenoid valves, two position, detented



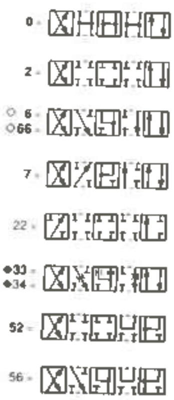
DG4V-3(S)-*N(-*)-V valves



Double solenoid valves, spring centered

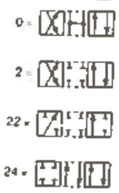


DG4V-3(S)-*C(-*)-V valves

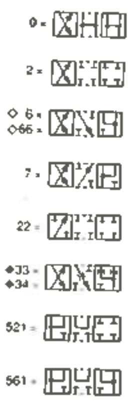


Single solenoid valves, solenoid at port A end

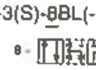
DG4V-3(S)-*A(-*)-V valves



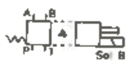
DG4V-3(S)-*B(-*)-V valves



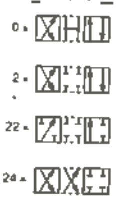
DG4V-3(S)-8BL(-*)-V valves



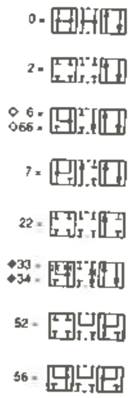
Single solenoid valves, solenoid at port B end



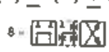
DG4V-3(S)-*AL(-*)-V valves



DG4V-3(S)-*BL(-*)-V valves



DG4V-3(S)-8B(-*)-V valves



▲ *Transient condition only.*
◆ *For differences see "Pressure drops" table, page 12.*
◇ *For differences see "Pressure drops" table, page 12, and "Max. flow rates" tables; page 10 for DG4V-3S; page 11 for DG4V-3.*
Note: Spool types shown in bold are featured in the "Preferred model selection", two pages on.

3. Model Code

Features shown in bold are found in the "Preferred model selection" on the next page. Features within brackets () are optional; all other features must be specified when ordering. Typical model code examples:
DG4V-3S-6C-M-FW-B5-60
DG4V-3-2A-VM-U-H7-60

DG4V-3(S) - * * ***(L)-(**)-(V)M-(S*)-***** (L)- * * -60-(EN***)-(P**-A**-B**-T**)**

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13

1 Standard or high performance
3 = High performance specification: up to 80 l/min (21 US gpm) at 350 bar (5075 psi)
3S = Standard performance specification: up to 40 l/min (10.5 US gpm) at 350 bar (5075 psi)

2 Spool type
See "Functional symbols" section. For other options consult your local Vickers representative.

3 Spool spring arrangement
A = Spring offset, end-to-end
AL = As "A" but left-hand build
B = Spring off-set, end-to-center
BL = As "B" but left-hand build
C = Spring centered
N = No-spring, detented
See also "Functional symbols" section.

4 Manual override option
No symbol = Plain override(s) in solenoid end(s) only▲
H = Water-resistant override(s) on solenoid end(s)▲
Y● = Latching manual override on solenoid ends (includes "H" feature seal)▲
Z = No overrides at either end
▲ *No override in non-solenoid end of single solenoid valves*
● *Not available on DG4V-3S, AC models*

5 Solenoid energization identity
V = Solenoid "A" is at port "A" end and/or solenoid "B" is at port "B" end, independent of spool type.
Omit for US ANSI B93.9 standard requiring solenoid "A" energization to connect P to A and/or solenoid "B" to connect P to B, independent of solenoid location.
Note: Type "8" spool valves conform to both methods thus for simplicity all "8" spool valves have the "V" code. See "Solenoid identity" table on page 16.

6 Spool indicator switch
Available on high performance models, DG4V-3, only.
Omit when not required.

For DG4V-3-*A(L)-(V)M models with type U (ISO 4400) electrical connector to solenoid; with spool type 0, 2 or 22 only:
S6 = LVDT type DC switch with Pg7 connector plug.

For DG4V-3-*A(L)-(Z)-(V)M-S*-FPA5W valves having mechanical type AC (~) switch, wired to 5-pin receptacle:
S3 = Switch, wired normally open
S4 = Switch, wired normally closed

For DG4V-3-*A(L)-(Z)-(V)M-S5-F(T)W/J valves having mechanical type AC (~) switch:
S5 = Switch, free leads

7 Solenoid type/connection(s)
U = ISO 4400 (DIN 43650) mounting◆
FW = ½" NPT thread conduit box
FTW = ½" NPT thread conduit box and terminal strip
FJ = M20 thread conduit box
FTJ = M20 thread conduit box and terminal strip
FPA = "Insta-plug" male receptacle only◆
FPBW = "Insta-plug" male and female receptacles
FPA3W = Junction box with 3-pin male connector◆ to NFPAT3.5.29-1980 for: DG4V-3-*A/B(L) DG4V-3S-*A/B(L)
FPA5W = Junction box with 5-pin male connector◆ to NFPAT3.5.29-1980 for: DG4V-3-*C/N DG4V-3S-*C/N DG4V-3-*A/B(L)-**-(V)M-S3/S4

6,3 mm (0.25") spade connector to IEC 780 (DC models only):
SP2 = Dual spade terminals
◆ *Female connector to be supplied by customer*

8 Indicator lights
For F type coil models: FTJL, FTWL, FPBWL, FPA3WL, FPA5WL (not FPA, male half connector only).
Lights available for all voltages listed, see 9 below.
L = Lights fitted
Omit L if lights not required.

For U type coil models use plug with integral light, see page 18

9 Coil rating
Full power coils, see "Operating Data".
A = 110V AC 50 Hz
B◇ = 110V AC 50 Hz/ 120V AC 60 Hz
C = 220V AC 50 Hz
D◇ = 220V AC 50 Hz/ 240V AC 60 Hz
G = 12V DC
H = 24V DC

For DG4V-3 only (not usable with DG4V-3S):
Low power coils, see "Operating Data".
BL = 110V 50 Hz/ 120V 60 Hz
DL = 220V AC 50 Hz/ 240V AC 60 Hz
GL = 12V DC
HL = 24V DC
◇ *For 60 Hz or dual frequency*

10 Port T code
Refer to "Operating Data" for port T pressure ratings
2 = for spool position indicator models S3, S4 and S5 (see position 6)
5 = for standard performance models, DG4V-3S, with AC or DC solenoids
6 = for **AC** high performance models, DG4V-3, including spool position indicator type S6
7 = for **DC** high performance models, DG4V-3, including spool position indicator type S6

11 Design number, 60 series
Subject to change. Installation dimensions unaltered for design numbers 60 to 69 inclusive.

[12] Special features
"EN***" code number assigned as required.
EN21 = CSA approved models, see below

[13] Port restrictor plugs
For details of plug orifice sizes and how to specify in model code see page 15.
May be fitted to valves by agreement with your Vickers representative.

Omit = No restrictor plugs fitted

Preferred Model Selection

The preferred products listed represent those models which are in regular volume production and are therefore most readily available at competitive prices. Other models constructed from the model code may be made available subject to the quantity requested. Please check price and availability before ordering.

North America

Function – see page 5	Connection, voltage and frequency	Design number
Models with conduit box◆ DG4V-3S-0B-M DG4V-3S-0C-M DG4V-3S-2A-M DG4V-3S-2C-M DG4V-3S-2N-M DG4V-3S-7C-M DG4V-3S-8C-VM DG4V-3S-66C-M	-F(T)W-B5 or -F(T)W-D5 or -F(T)W-H5	-60(*)
Models with ISO 4400 connector DG4V-3S-2A-M DG4V-3S-2C-M DG4V-3S-2N-M DG4V-3S-8C-VM DG4V-3S-66C-M	-U-B5 or -U-G5 or -U-H5	

Outside of North America

Function – see page 5	Connection, voltage and frequency	Design number
Models with ISO 4400 connector DG4V-3(S)-2A-M DG4V-3(S)-0B-M DG4V-3(S)-2B-M DG4V-3(S)-0C-M DG4V-3(S)-2C-M DG4V-3(S)-2N-M DG4V-3(S)-6C-M DG4V-3(S)-7C-M DG4V-3(S)-8C-VM DG4V-3(S)-33C-M DG4V-3(S)-52C-M	-U-A6(5) or -U-C6(5) or -U-G7(5) or -U-H7(5)	-60

Examples:
DG4V-3S-2C-M-FTW-D5-60
DG4V-3S-2C-M-FTW-D5-60-EN21*
DG4V-3S-2N-M-U-H5-60

DG4V-3-8C-VM-U-H7-60
DG4V-3S-8C-VM-U-H5-60

◆ ***Canadian Standards Association Certificate***
Valves with ½" NPT entry conduit box, type FW (model code position [7]), and solenoid code letters B, D, G and H (model code position [9]) have Canadian standards certification. Specify -EN21 (at model code position [12]) to have valve supplied with appropriate CSA coding on nameplate.

Models with "F" type coils (lead wires) and conduit box.

Double solenoid models ▲
DG4V-3(S)-*C-**-(V)M-F-**(L)-60
DG4V-3(S)-*N-**-(V)M-F-**(L)-60

Single solenoid models ▲
DG4V-3(S)-*A(-**)● }
DG4V-3(S)-*B(-**)● } As shown
DG4V-3(S)-8BL(-**) }

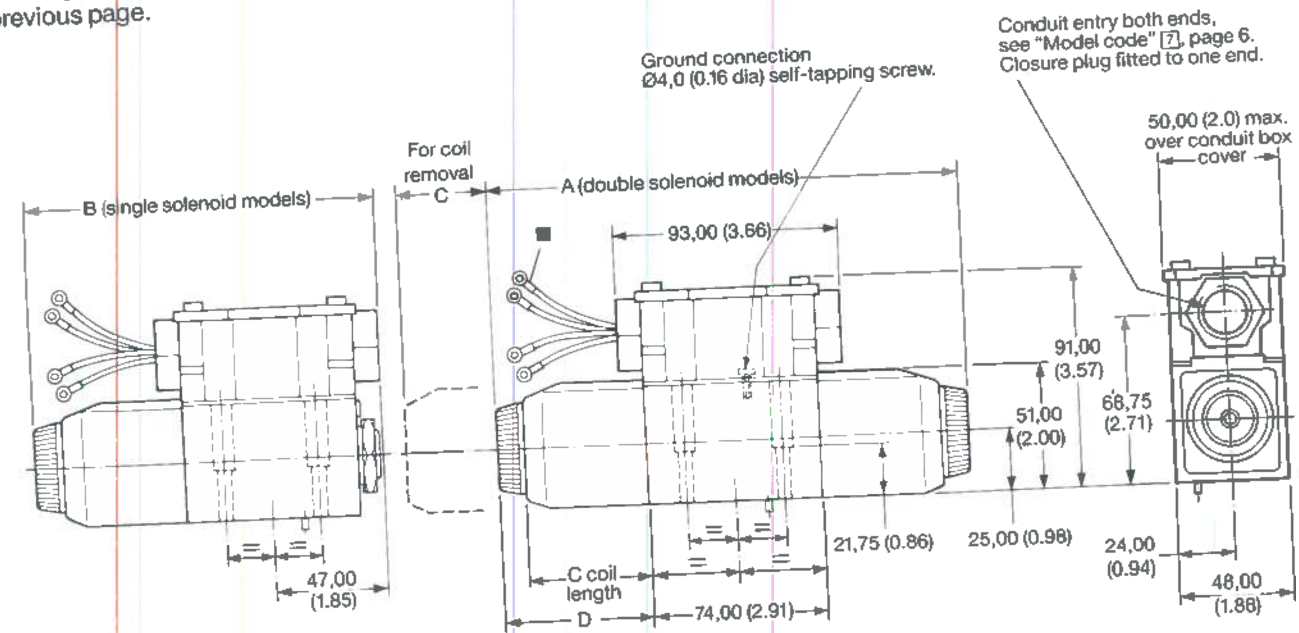
DG4V-3(S)-*AL(-**)● }
DG4V-3(S)-*BL(-**)● } Solenoid and end cap interchanged
DG4V-3(S)-8B(-**) }

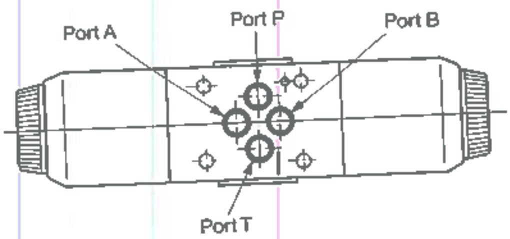
For details of terminal strip and lights see page 16.

For details of pre-wired NFPA connector options see page 17.

For details of Vickers "Insta-Plug" see page 18.

For details of water-resistant and of latching type manual overrides see previous page.





Model type	AC or DC	A	B	C	D
All	DC ═	220 (8.66)	156,5 (6.16)	61 (2.51)	73 (2.87)
DG4V-3	AC ~	200 (7.87)	146,5 (5.77)	51 (2.12)	63 (2.48)
DG4V-3S	AC ~	200 (7.87)	146,5 (5.77)	45 (2.12)	63 (2.48)

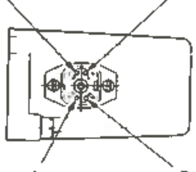
● *Not applicable to type "8" spool*

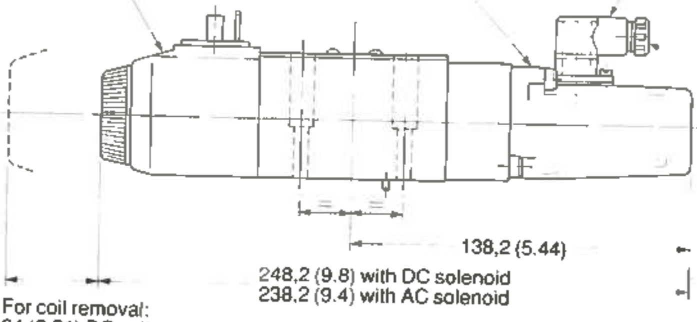
▲ *For solenoid identities see table on page 16.*

■ *Ref. "model code" 7:*
Codes "FJ" and "FW": 2 lead wires for each solenoid, approximately 150,00 (6.00) long. M3 (#6) terminals provided for customer connection.
Codes "FTJ" and "FTW": valve supplied with lead wires connected into terminal strip suitable for M3 (#6) terminals for customer connection.

DG4V-3-*A(L)-(V)M-S6-U-**-60

Single solenoid models with LVDT type switch indicating when the spool is in the spring off-set position. ISO 4400 (DIN 43650) connection to solenoid; Pg7 connection to switch.



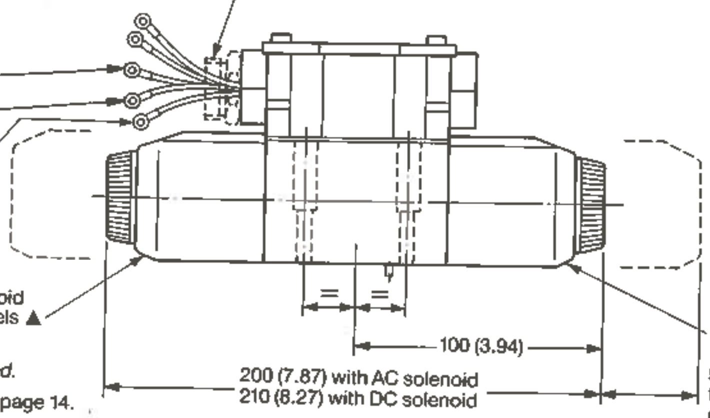


▲ *For LH build (e.g. DG4V-3-*AL---60) solenoid and switch locations are reversed.*

Other dimensions as DG4V-3 models, page 13

DG4V-3-*A(L)-(Z)-(V)M-S3-FPA5W-*2-60
DG4V-3-*A(L)-(Z)-(V)M-S4-FPA5W-*2-60
DG4V-3-*A(L)-(Z)-(V)M-S5-F-*2-60

Single solenoid models with mechanical type switch monitoring of spool movement.
Conduit box with leads, or pre-wired to NFPA T3.5.29-1980 receptacle.



▲ *For LH builds (e.g. DG4V-3-*AL----60) solenoid and switch locations are reversed.*

Other dimensions as DG4V-3-**C/N models, page 14.

Port Restrictor Plugs

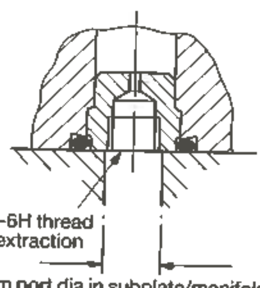
Restrictor plugs are available for use in ports P, T, A or B. These can be used for restricting flow or for circuit dampening. Restrictor plugs are not recommended for use above 210 bar (3000 psi) system pressure.

Typical model codes:
DG4V-3(S)-**-M-**-**-60-P08
(0.8 mm dia orifice in port P)
DG4V-3(S)-**-M-**-**-60-P10-A10
(1.0 mm dia orifice in ports P and A)

Restrictor plug selection table

Code	Orifice diameter	Part number■
*00	Blank	694353
*03	0,30 (0.012)	694341
*06	0,60 (0.024)	694342
*08	0,80 (0.030)	694343
*10	1,00 (0.040)	694344
*13	1,30 (0.050)	694345
*15	1,50 (0.060)	694346
*20	2,00 (0.080)	694347
*23	2,30 (0.090)	694348

** = P, T, A or B, as required*
■ *Available in multiples of 25 per part number.*

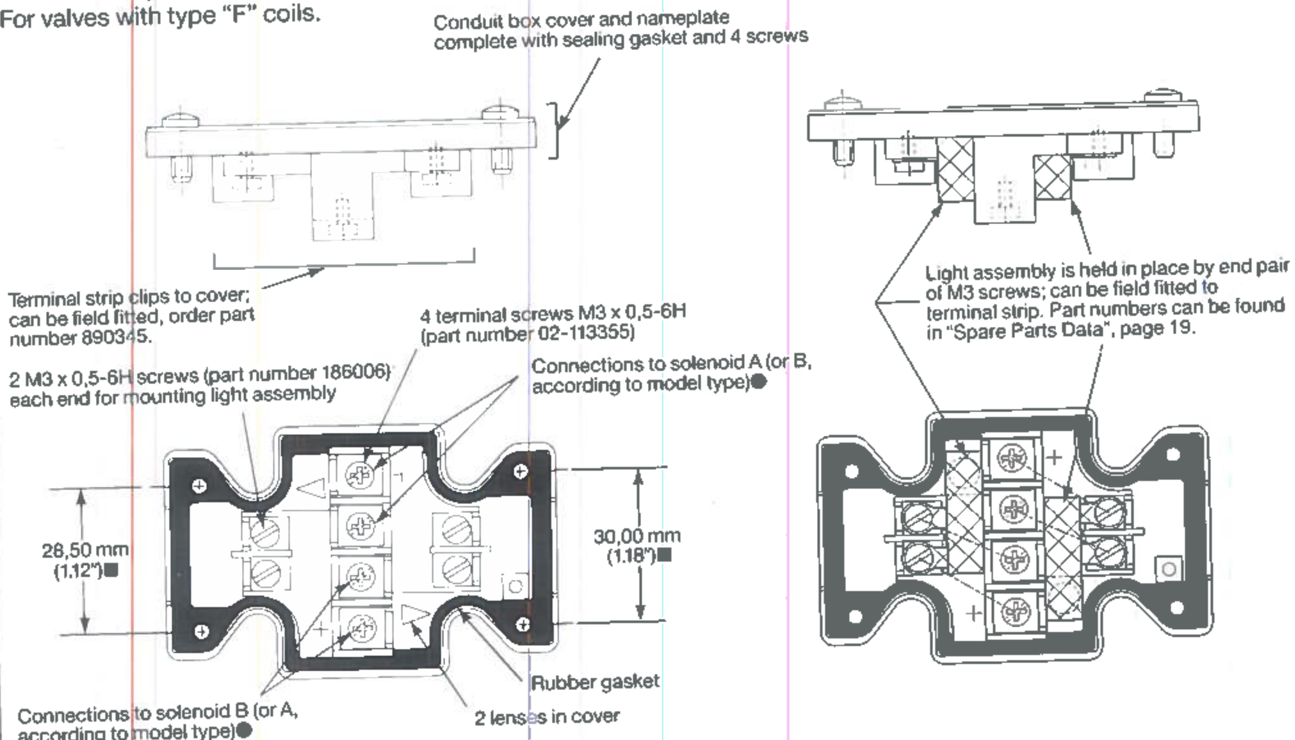


7. Mass, approx. kg (lb)

	"U" coils	"F" coils + conduit box
DG4V-3 and DG4V-3S with DC coil(s):		
Single solenoid valve	1,6 (3.5)	1,8 (4.0)
Double solenoid valve	2,2 (4.8)	2,3 (5.0)
DG4V-3 and DG4V-3S with AC coil(s):		
Single solenoid valve	1,5 (3.3)	1,6 (3.5)
Double solenoid valve	1,8 (4.0)	2,0 (4.4)
Single solenoid valve with position switch	2,0 (4.4)	2,0 (4.4)

8. Electrical Plugs and Connectors

Terminal Strip and Lights
For valves with type "F" coils.



●1. *For DC coils the +ve lead(s) must be connected to the terminal(s) marked +. When using 3-wire incoming leads to double solenoid valves (i.e. common neutral) the inner pair of terminals must be inter-connected.*

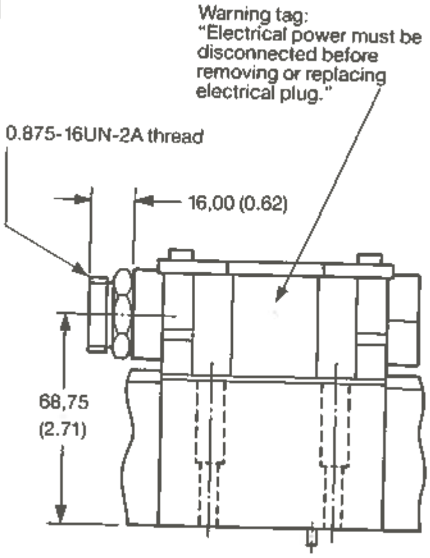
2. *For correct light indication of energized solenoid ensure that solenoid leads are correctly connected: light terminals are common with each outer pair of solenoid terminals according to the side with + mark.*

■ *Difference in these dimensions ensures correct orientation of nameplate solenoid identities to valve.*

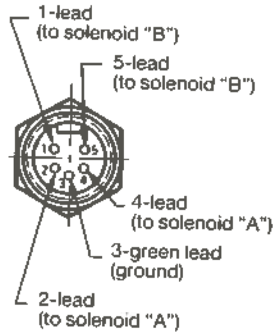
NFPA Connector T3.5.29-1980
DG4V-3(S)---FPA3W(L)-**-60
DG4V-3(S)---FPA5W(L)-**-60
DG4V-3---S3-FPA5W(L)-**-60
DG4V-3---S4-FPA5W(L)-**-60

The receptacle is a standard three or five pole connector with shortened leads and terminals added. The five pole plug has four leads 101,6 (4.0) long and one 177,8 (7.0) long. The three pole plug has two leads 101,6 (4.0) long and one 177,8 (7.0). All wires have underwriters recognized non-solder insulated eyelet terminals. The green wire is used for the ground (earth) connection (No. 8 screw furnished). Valves are supplied pre-wired.

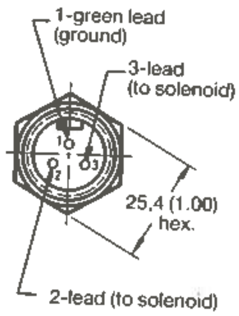
Connection details and model type/model code references



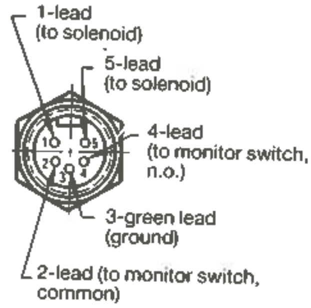
5 pin connector
Use with double solenoid valve (page 14).
Key model code designations:
DG4V-3(S)-*C(-**)-(V)M-FPA5W(L)
DG4V-3(S)-*N(-**)-(V)M-FPA5W(L)



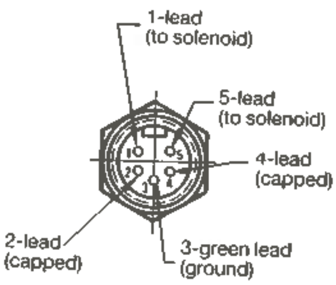
3 pin connector
Use with single solenoid valve (page 14).
Key model code designations:
DG4V-3(S)-*A(L)(-**)-(V)M-FPA3W(L)
DG4V-3(S)-*B(L)(-**)-(V)M-FPA3W(L)



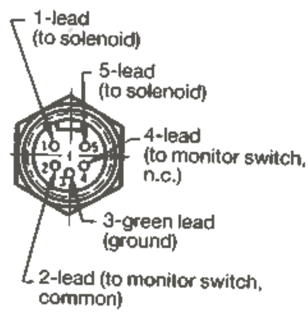
5 pin connector
Use with single solenoid valve with spool position monitor switch (page 15).
Key model code designations:
DG4V-3-*A(L)(-**)-(V)M-S3-FPA5W(L)



5 pin connector
Use with single solenoid valve (page 14).
Key model code designations:
DG4V-3(S)-*A(L)(-**)-(V)M-FPA5W(L)
DG4V-3(S)-*B(L)(-**)-(V)M-FPA5W(L)



5 pin connector
Use with single solenoid valve with spool position monitor switch (page 15).
Key model code designations:
DG4V-3-*A(L)(-**)-(V)M-S4-FPA5W(L)



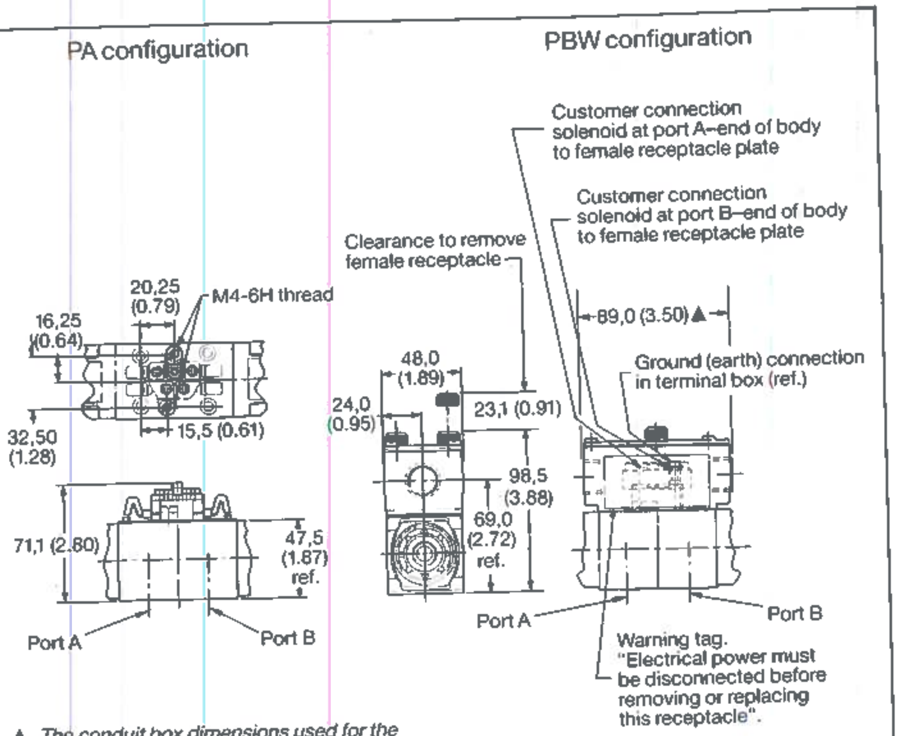
Insta-Plug
DG4V-3(S)---FPA---60
DG4V-3(S)---FPBW---60
(Applies to valve types shown on page 14.)

Vickers 2-part "Insta-Plug" eliminates breaking electrical inputs for valve disconnect. A male half is pre-wired to the valve body. The mating plug is inside a wire housing with external terminals for machine wire connections.

Captive thumb screws, when loosened, permit the wire housing to be pulled clear of the valve for disconnect. A longer ground post provides first make/last break ground connection.

The PBW configuration combines both male and female plugs in the wiring housing for a self-contained plug-in unit.

Optional solenoid indicator lights are pre-wired to the female plug. Solenoids "A" and/or "B" are identified on the wiring housing.



▲ *The conduit box dimensions used for the PA/PBW type connector are different to those on the other "F" type coil models, e.g. overall length for PA/PBW conduit box is 89,00 (3.50); for other models it is 93,00 (3.66).*

For other dimensions of the valve see page 14.

Plugs for ISO 4400 (DIN 43650) Type Coil Connection
For valves with type "U" coils

The cable entry on these plugs can be repositioned at 90° intervals by reassembly of the contact holder relative to the plug housing.

The cable entry is Pg.11, for cable Ø 6-10 mm (0.24 to 0.39" dia).

Order separately by part number.

Plugs without indicator lights

Part no.	Color	Use on solenoid coil
710775	Black	Sol. B
710776	Gray	Sol. A

Plugs with indicator lights

Voltage	Part number Gray (sol. A)	Black (sol. B)
12- 24V	977467	977466
100-125V	977469	977468
200-240V	977471	977470

9. Installation Data

Mounting Attitude

No restrictions except for no-spring, detented models DG4V-3-*N and DG4V-3S-*N which should be mounted with the spool axis horizontal. These model types may be affected by severe vibration or shock, especially if a solenoid is not held energized.

Mounting Bolt Kits

Bolt kits for direct mounting:
Metric thread, M5-6g ..... BK 616452M
Inch, 10-24UNC-3A .... BK 590716

Notes:
1. Bolts should be torqued to 7-9 Nm (63-80 lbf in) with threads lubricated.
2. If not using Vickers recommended bolt kits, bolts must be to grade 12.9 (ISO 898) or better.

When mounting DG4V-3(S) valves together with Vickers SystemStak™ valves, determine bolts requirements from table in SystemStak™ catalog C-2027.

Subplates, Manifolds and Mounting Surface

For BSPF port threads and metric mounting bolt types, refer to data sheet V-1310 (see section "J" of catalog C-2005).

For SAE straight port threads and UNC (or metric) mounting bolt types, refer to data sheet I-517355 (see section "I" of catalog #400).

10. Spare Parts Data

Solenoid Coils

AC coils

Code	Voltage/ frequency	"U" type	"F" type	"U" type	"F" type
Full power coils:					
A	110V/50 Hz	02-101725	02-101730	507825	508166
B	110/120V/50/60 Hz	02-101726	02-101731	507833	508169
C	220V/50 Hz	02-101727	02-101732	507826	508167
D	220/240V/50/60 Hz	02-101728	02-101733	507834	508170
Low power coils:					
BL	110/120V/50/60 Hz	N/A	N/A	598562	698563
DL	220/240V/50/60 Hz	N/A	N/A	866455	866457

DC coils

Code	Voltage	"U" type	"F" type	"SP2" type
Full power coils:				
G	12V	507847	508172	02-111166
H	24V	507848	508173	02-111168
Low power coils:				
GL	12V	507855	508175	N/A
HL	24V	507852	508174	N/A

Seal Kits

For valves with spool indicator switch, model types DG4V-3-*A---M-S*---60
.... kit no. 859049
For other models seal kits vary according to type of coil fitted:
For "U" type coil .... kit no. 858995
For "F" type coil .... kit no. 858996

Note: Each seal kit covers a variety of models and may have redundant seals for a particular model.

Light Assemblies

For valves with "F" type coils (lead wires) and conduit box.

Lights can be fitted directly to terminal strip of valves designated "FTW" or "FTJ" in model code position [7]; for designations "FW" or "FJ", order appropriate light kit/terminal strip assembly. Refer to section "Electrical Plugs and Connectors", page 16, or Spare Parts Bulletin for assembly details.

Select light according to coil voltage, one light per solenoid.

Coil voltage	Light kit ▲ part number	Identifying color	Light kits with terminal strip ▲
110/50; 120/60	893234	Red	893229
220/50; 240/60	893235	Blue	893230
12V DC	893231	Black	893226
24V DC	893232	Green	893227

▲ *Each kit contains 2 lights.*

11. Ordering Procedure

When ordering please specify full model designations of valves (see "Model code" section) and part or kit numbers of spare parts as in the previous section. See "Preferred model selection", page 7.

Hydraulics, electro-hydraulics, electronics: high performance products with quality standards second to none – for enhanced productivity and economy.

Vickers components and systems are used extensively for in-plant machinery, mobile vehicles, automotive equipment, aerospace and marine applications.

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VICKERS

Power Amplifier

Type EEA-PAM-513-A-12
For KCG-3, 10 Series
Proportional Pressure Control Valves

1. General Description

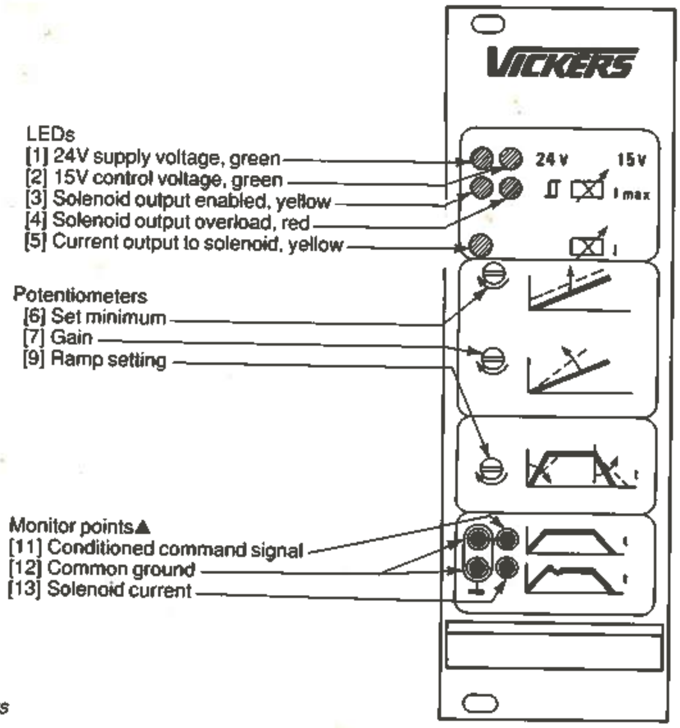
The power amplifier has five voltage inputs (one inverting) and a current input for 0-20 mA. The "set minimum" and "gain" adjustments allow the amplifier to be easily tuned to the proportional pressure control valve. The ramp potentiometer on the front panel simultaneously adjusts the output acceleration and decleration. The ramp function is normally enabled; it can be permanently disabled by an external wire link, or selectively enabled/disabled using a remotely located switch.

Monitor points on the front panel allow measurement of the conditioned command input signal (after set minimum, gain and ramp functions) and of the solenoid current. The latter is scaled to give 1 volt per ampere.

Features

- User-friendly front panel with all the necessary adjustments, LEDs and monitor points
- Electronic overload protection with automatic reset
- Pulse width modulation for high efficiency
- Ramp function generator for control of pressure increase and decrease rates
- 24V DC power supply
- Either current or voltage input signals
- Standard input and output signals

2. Front Panel



▲ Ø 2 (0.0787 dia) sockets

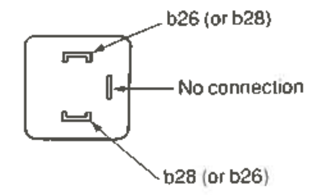
3. Operating Data

Power requirements	24V DC nominal x 40W Maximum voltage range: 20 to 30V (including ripple) Max. ripple 2V pk-to-pk Reverse polarity protected
Output voltages for control: At pin z22 At pins z2 and b2	 +15V x 50 mA; ripple <50 mV pk-to-pk ±10V (±1%) x 5 mA
Command signal inputs Voltage inputs: Direct-voltage pins Inverting-voltage pin Voltage range Input impedance Current input: Current pin Current range Input impedance	 b8, b6, z8, b10 z10 0 to 10V 47 kΩ z6 0 to 20 mA 100Ω
Power drive, pulse-width modulated (PWM): Maximum solenoid current	 1,8A, short-circuit protected
Dither	Factory set
Set minimum pressure control: Factory setting Adjustment	 Zero solenoid current 0 to 1,0A solenoid current
Gain control: Factory setting Adjustment	 Max. pressure at 10V command signal 0,06 A/V to 0,18 A/V
Ramp time adjustment: Factory setting One adjustment for increasing and decreasing pressure	 Minimum (20 ms approx.) 20 ms to 2s with "set minimum" at zero
Overload detection, factory set	Automatic reset when fault removed
Drive enable/disable: Enable (power available to solenoid) Disable (no power to solenoid)	 +10V to +30V to z24 (>6 kΩ) Open circuit or up to 0,8V
Ramps enable/disable: Enable (valve switching rate limited by ramp potentiometer) Disable (fastest valve switching; ramp circuit bypassed)	 No connection required Connect b20 to b12
Command signal monitor points: Front panel socket and b18 Output impedance	 0 to 10V full scale. Command signal conditioned by "set minimum", gain and ramp function settings. 10 kΩ; short-circuit protected
Solenoid current monitor points: Front panel socket and z18 Output impedance	 1 V/A solenoid current 10 kΩ; short-circuit protected

Continued on next page

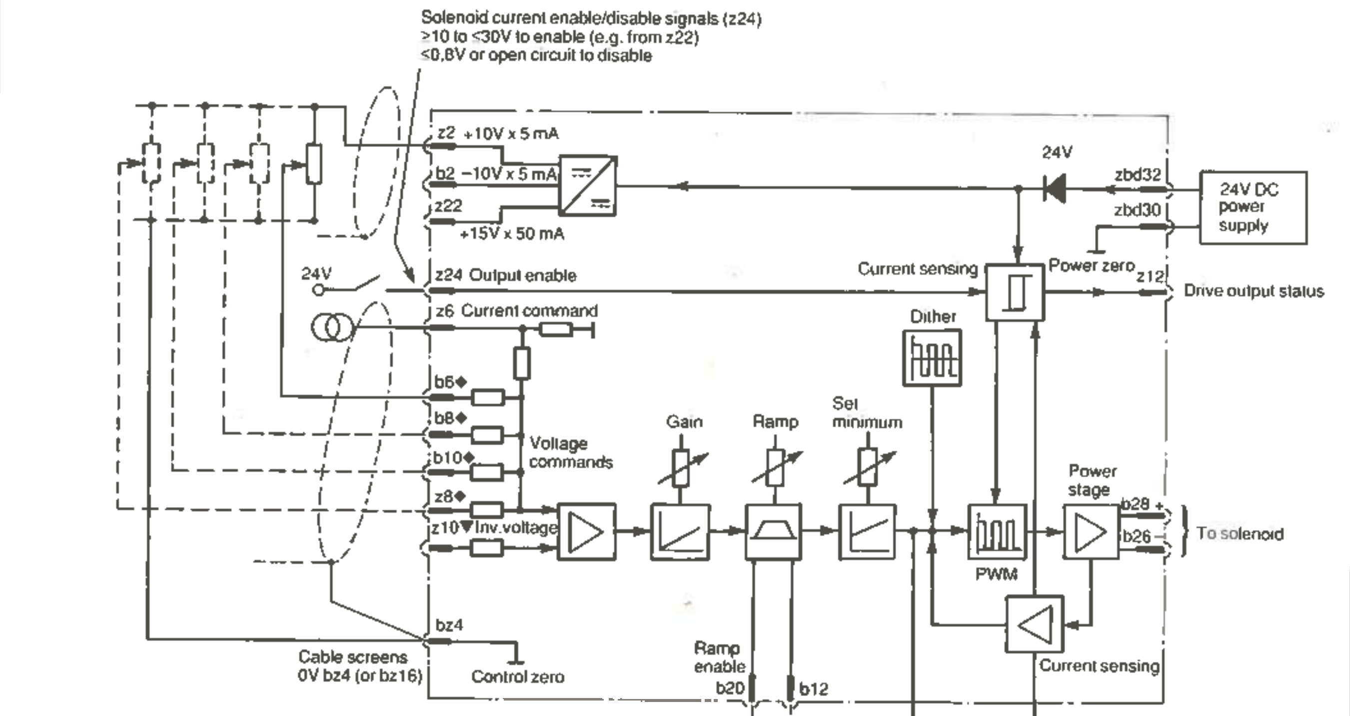
Drive output status indicator b12: Drive enabled Drive disabled	 >+6V <–6V
Ambient temperature range	0 to 50°C (32 to 122°F)
Edge connectors	DIN 41612 F48 male type on the board. Mating connector can be F32 or F48 female type.
Mass	200g (0.44 lb)
Installation recommendations leaflet for electronic amplifiers	ML-B-9046
Supporting products (see catalog C-2007): Power unit Portable test equipment Cardholder (F32) Edge connector (F48)	 EHA-PSU-704-A-10 EHA-TEQ-700-A-20 Part no. 732682 Part no. 508178

Solenoid Connections



Note: Connections *not* polarity sensitive

4. Circuit and Connections



Note: Connect all shields/screens at card end only.

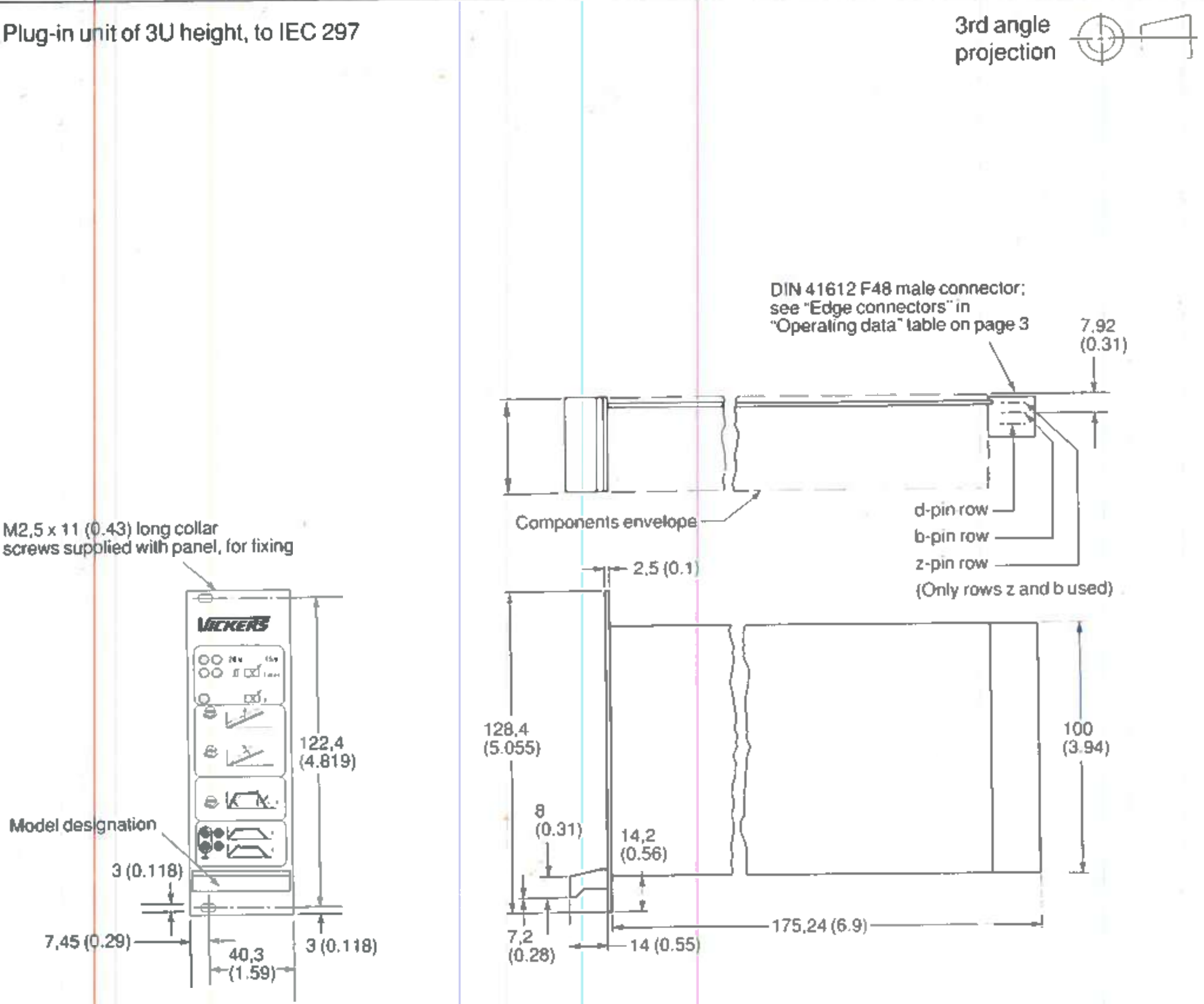
◆ *Non-inverting voltage commands*

▼ *Inverting or differential voltage command*

▲ *On front panel*

5. Installation Dimensions in mm (inches)

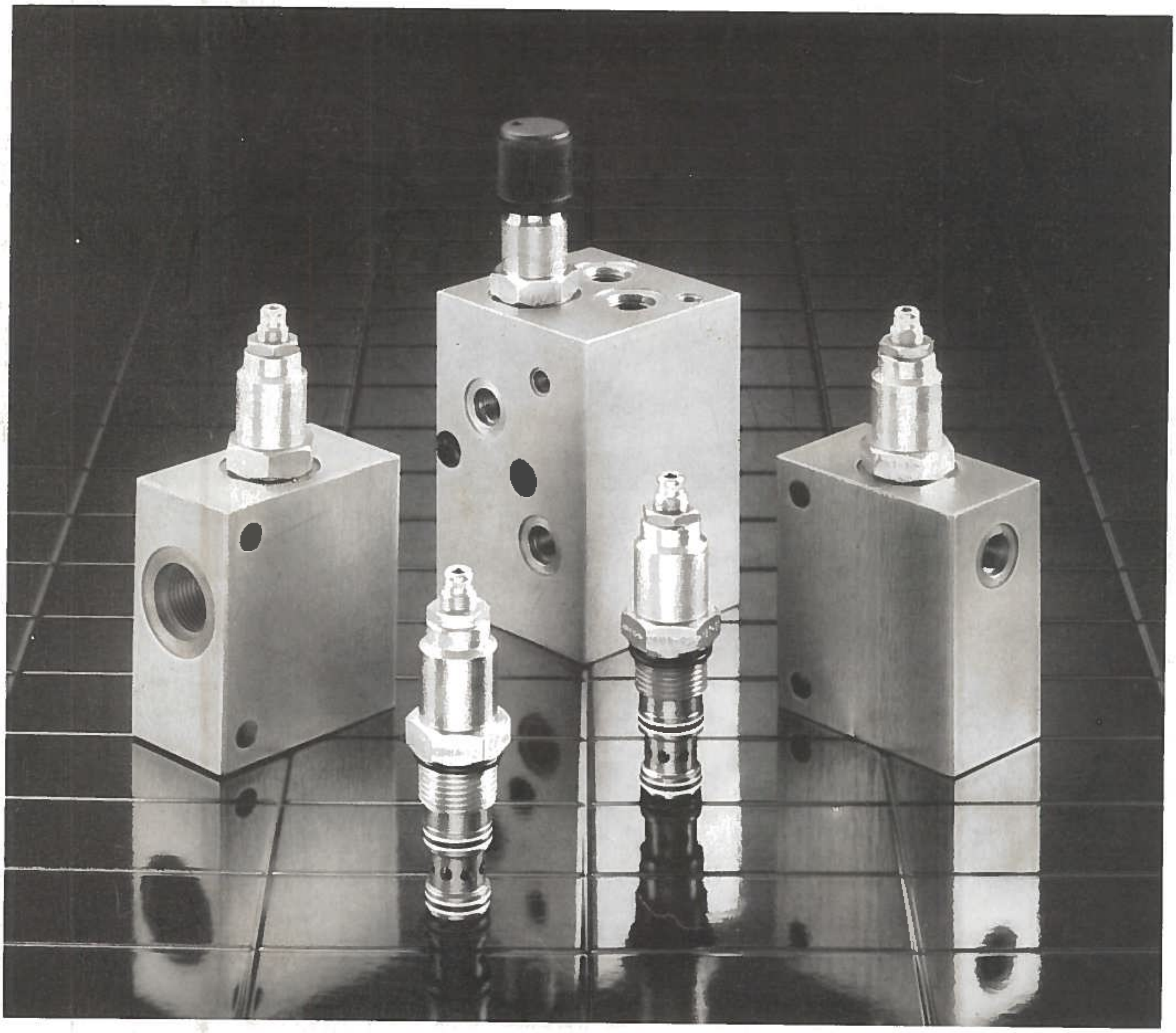
Plug-in unit of 3U height, to IEC 297



Presented by:

VICKERS
A TRINOVA Company

Screw-in Cartridge-Valves Size 12



September 1992

GB-C-2262

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Counter Balance Valves

Application

Vickers screw-in cartridge counter-balance valves provide continuous protection from pump cavitation and prevent an actuator from running ahead of the pump supply. Operating as pilot operated load control valves with a reverse flow check function, they are easily integrated into Vickers MCD manifold systems or used individually in a variety of standard blocks.

Vickers screw-in cartridge counterbalance valves also provide thermal relief protection in closed systems.

Features and Benefits

Cartridge Design
Offers maximum system design flexibility using minimum manifold space.

Ease of Service
Compact cartridge design may easily be replaced in the field, if required.

345 Bar Rated Pressure
Applicable to virtually all industrial and mobile system requirements.

Efficent Design
Low leakage design restraints flow from the hydraulic actuator.

Hardened and Ground Steel Operating Parts
Maximum durability and long life.

Reverse Flow Check
Allows free flow in the reverse direction.

Integral Pilot Assist
Choice of two pilot ratios for smooth control of loads and cushioned deceleration.

Multiple Mounting Configurations
Offers maximum design flexibility with minimal piping required. SystemStak™ valves are also available, (ISO 4401, CETOP 5, ANSI/NFPA D05).

Ratings

Performance data is typical with fluid at 28 cST (132 SSU) and 38° C (100° F)

Maximum Pressure (All Ports)	345 bar (5000 psi)
Rated Flow	114l/min (30m USgpm)
Cracking Pressure Adjustment Range	62 – 207 bar (900 – 3000 psi) 186 – 345 bar (2700 – 5000 psi)
Pilot Ratios	4:1, 10:1
Leakage	5 drops/min, Port 1 to Port 2 at 77% of crack setting
Pressure Drop Characteristics	See pressure drop curves.
Temperature Ranges	–40 to 120° C (–40 to 248° F)

Fluids

All general purpose hydraulic fluids such as MIL–H–5606, SAE 10, SAE 20, etc.
Refer to Vickers oil sheet I-286-S.

Filtration

ISO 4406, Class 16/13 or cleaner

Materials

Aluminium or steel

Cavity

C–12–3S (See page 3)

Weight

0.356 kg (0.785 lbs)

Pilot Pressure Calculation (To open valve by remote control)

For 4:1 Ratio

Pilot pressure, nominal at port 3 =

$$\frac{\text{Cracking pressure} + (5 \times \text{Port 2 pressure}) - \text{Port 1 pressure}}{4}$$

For 4:1 Ratio

Pilot pressure, nominal at port 3 =

$$\frac{\text{Cracking pressure} + (11 \times \text{Port 2 pressure}) - \text{Port 1 pressure}}{10}$$

Model Code

CBV* – 12* – * – ** * – ** / ****

1 2 3 4 5 6 7 8 9 10

1 Valve Function

CBV – Counterbalance valve

2 Pilot Ratio

1 – 4:1
2 – 10:1

3 Valve Size

12 – Size 12

4 Seals

Blank – Buna "N"
V – Viton

5 Adjustment Options

S – Screw with locknut
C – Cap over screw
K – Hand knob

6 Cartridge/Valve

O – Cartridge

Cartridges with Housings:

I – Inline body
B – $^{3}/_{4}$" SAE 4-bolt pad mounting
N – Close coupled – nipple mounting
G – Gasket mounted – single
D – Dual counterbalance – line mounted
M – Dual counterbalance – line mounted with integral shuttle valve
P – Dual counterbalance – gasket mounted

7 Valve Housing Material

A – Aluminum
standard light duty housing, maximum operating pressure 207 bar (3000 psi)

S – Steel
standard fatigue rated housing, NFPA pressure rated 345 bar (5000 psi)

8 Housing Port Sizes

I – Inline Body
4G – $^{1}/_{2}$" BSPP
6G – $^{3}/_{4}$" BSPP
10T – SAE 10
12T – SAE 12

B – 4-Bolt Pad
4T – $^{3}/_{4}$" SAE

N – Nipple Mounting
8T – SAE 8

G – Gasket Mounted (Single)
8T – SAE 8
4G – $^{1}/_{2}$" BSPP

D – Dual Line Mounted
10T – SAE 10
12T – SAE 12
4G – $^{1}/_{2}$" BSPP

M – Dual Line Mounted
10T – SAE 10
12T – SAE 12
4G – $^{1}/_{2}$" BSPP

P – Dual Gasket Mounted
8T – SAE 8
4G – $^{1}/_{2}$" BSPP

9 Pressure Range

30 – 62–207 bar (900–3000 psi)
50 – 186–345 bar (2700–5000 psi)

10 Pressure Setting (Opt.)

(Specified by customer in 100 psi increments) otherwise:
20 – 138 bar (2000 psi)
35 – 241 bar (3500 psi)

Counterbalance Cartridge

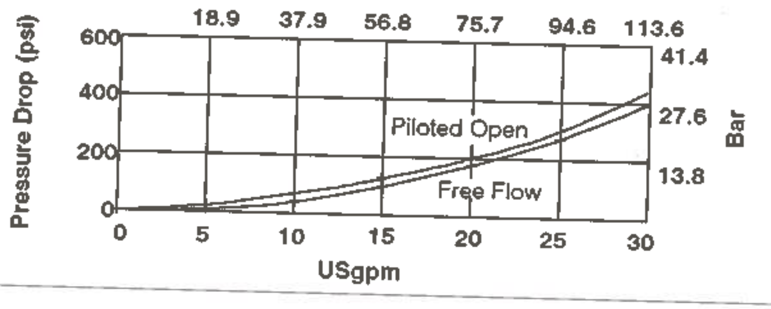
CBV*-12*-*-O

Pressure Drop Curve

Cartridge Only

Free flow crack pressure – 4 psi

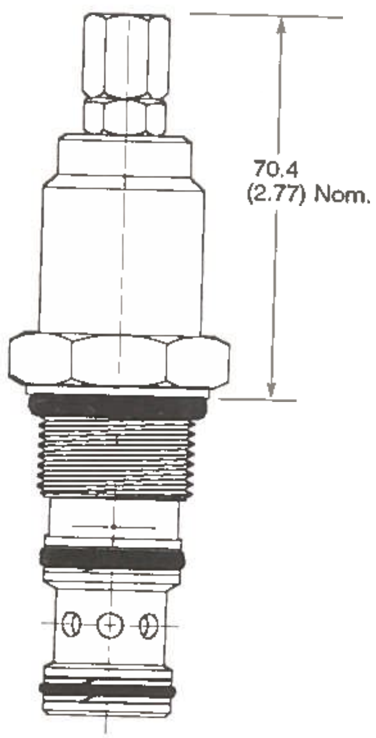
28 cSt (132 SSU) oil @ 38°C (100°F)



Adjustment Options

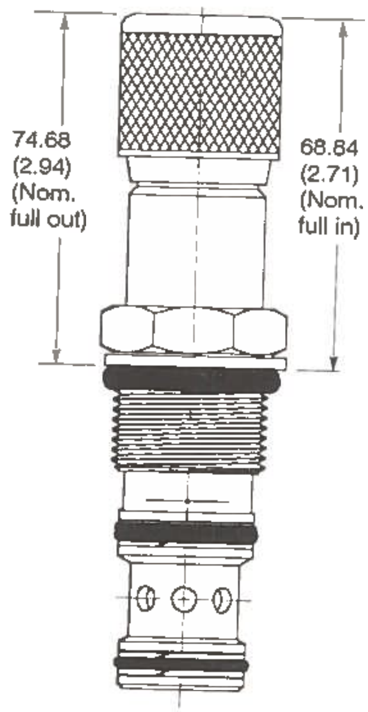
Dimensions mm(inch)

"C" (Cap over screw) Adjustment

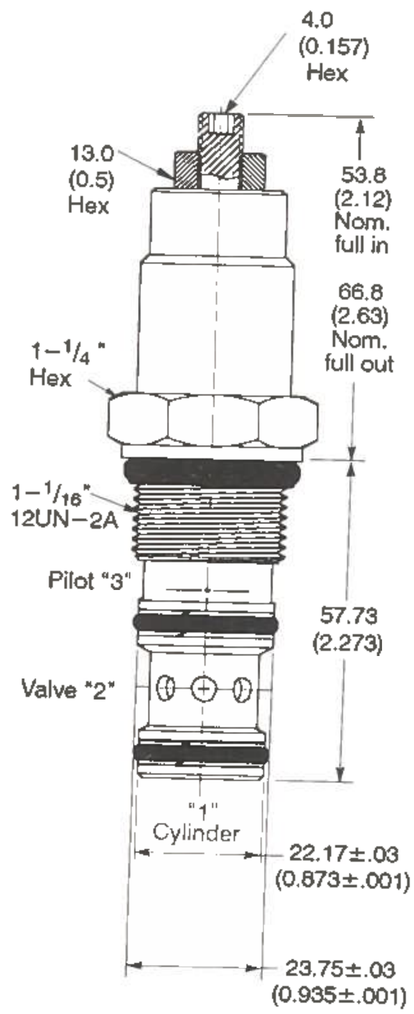


"K" (Handknob) Adjustment

Screw OUT to increase pressure setting;
Screw IN to release load.



"S" (Screw w/locknut) Adjustment



Standard Cavity Dimensions

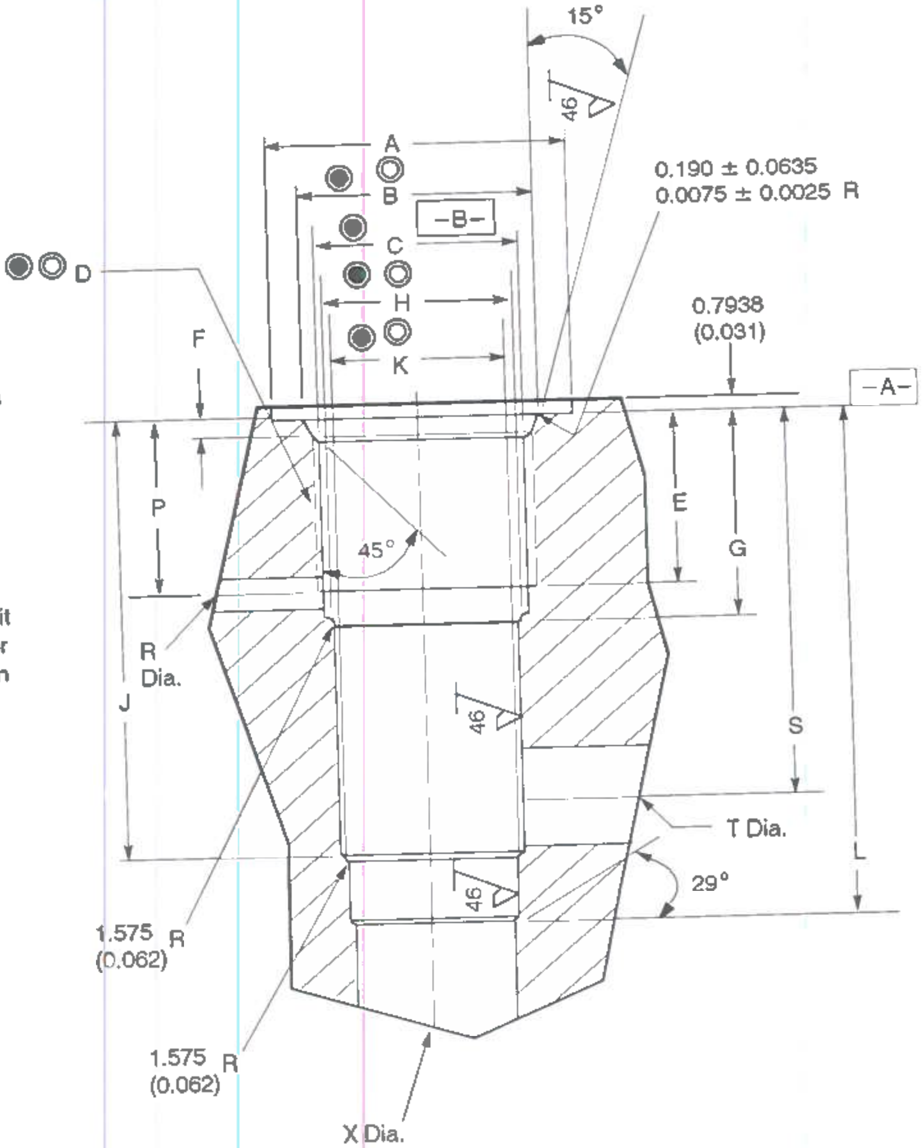
C-12-3S, 3-Way Short Cavity

mm (Inch)

The counterbalance cartridge in this catalog is designed to fit into the cavity dimensioned on this page.

Cavity bores can be machined accurately in aluminum or steel. The necessary UNF, or UN threads may be machined using standard small tools, possibly already in your machine shop or from a local tool supplier. For in depth advice on the machining of cavities, consult your Vickers sales specialist.

Either you, our customer, or Vickers can design and manufacture customized manifolds or housings dedicated to individual applications. We call the resulting valve packages Modular Circuit Designs (MCDs). Cartridges selected for your application can be accomodated in one or more MCDs, according to your requirements.



Cavity

Cavity	A Spotface	B .002	C .002	D Thread thd. class 2B	E Full Thread	F	G	H ± .001	J	K ± .001
C–12–3S	38.1 (1.5000)	29.160 (1.148)	24.765 (0.975)	26.988 (1 1/16–12)	22.225 (0.875)	3.302/3.683 (0.130/0.145)	25.4 (1.000)	23.825 (0.938)	48.26 (1.900)	22.25 (0.876)

L	P	R Max. Dia.	S	T Max. Dia.	X Max. Dia.
59.69 (2.350)	22.23 (0.875)	4.826 (0.190)	41.275 (1.625)	12.7 (0.500)	20.625 (0.812)

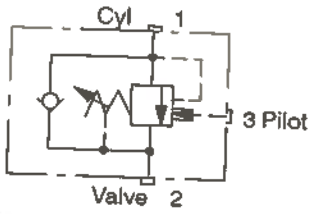
◉ These diameters | ↗ | .0508 mm (.002 inch) | B | unless otherwise specified.

◎ These diameters | ⊥ | .0254 mm (.001 inch) | A | unless otherwise specified.

Inline

CBV*-12*-*-I

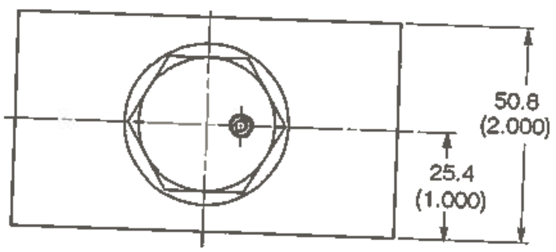
Functional Symbol

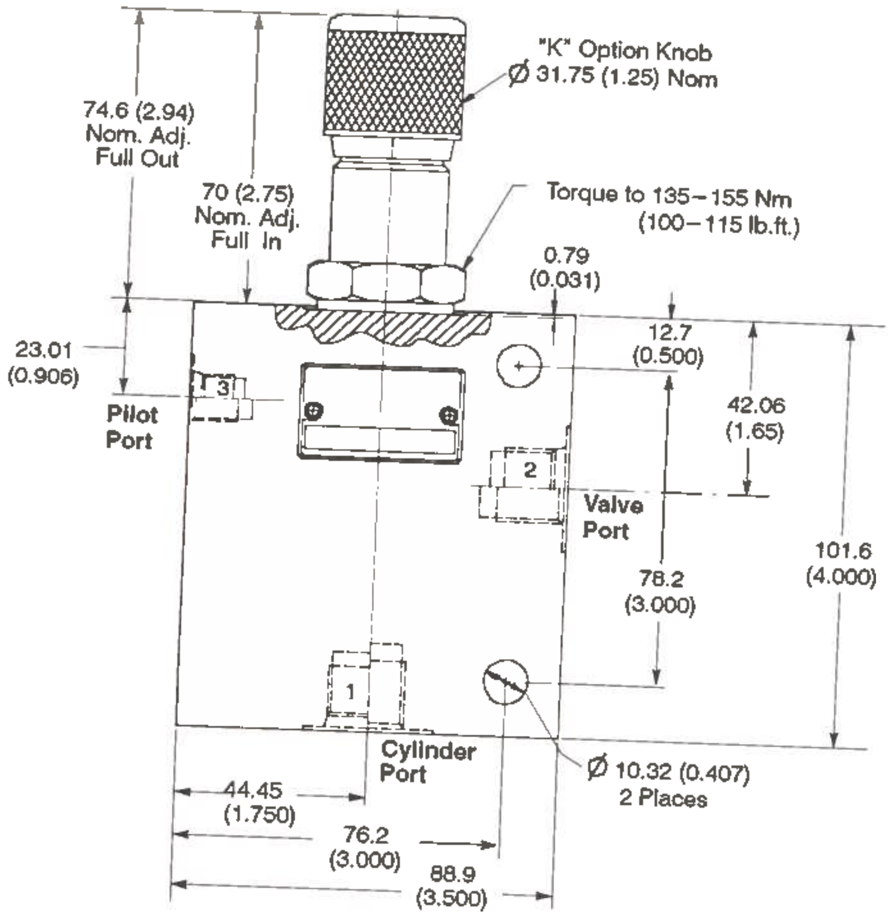


Dimensions

mm(inch)

Port Size	Cylinder Port (1)	Valve Port (2)	Pilot Port (3)
10T	SAE 10	SAE 10	SAE 6
12T	SAE 12	SAE 12	SAE 6
4G	1/2" BSPP	1/2" BSPP	3/8" BSPP
6G	3/4" BSPP	3/4" BSPP	3/8" BSPP

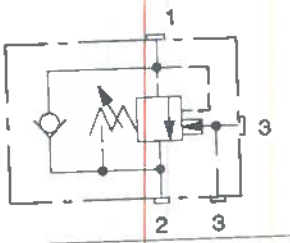




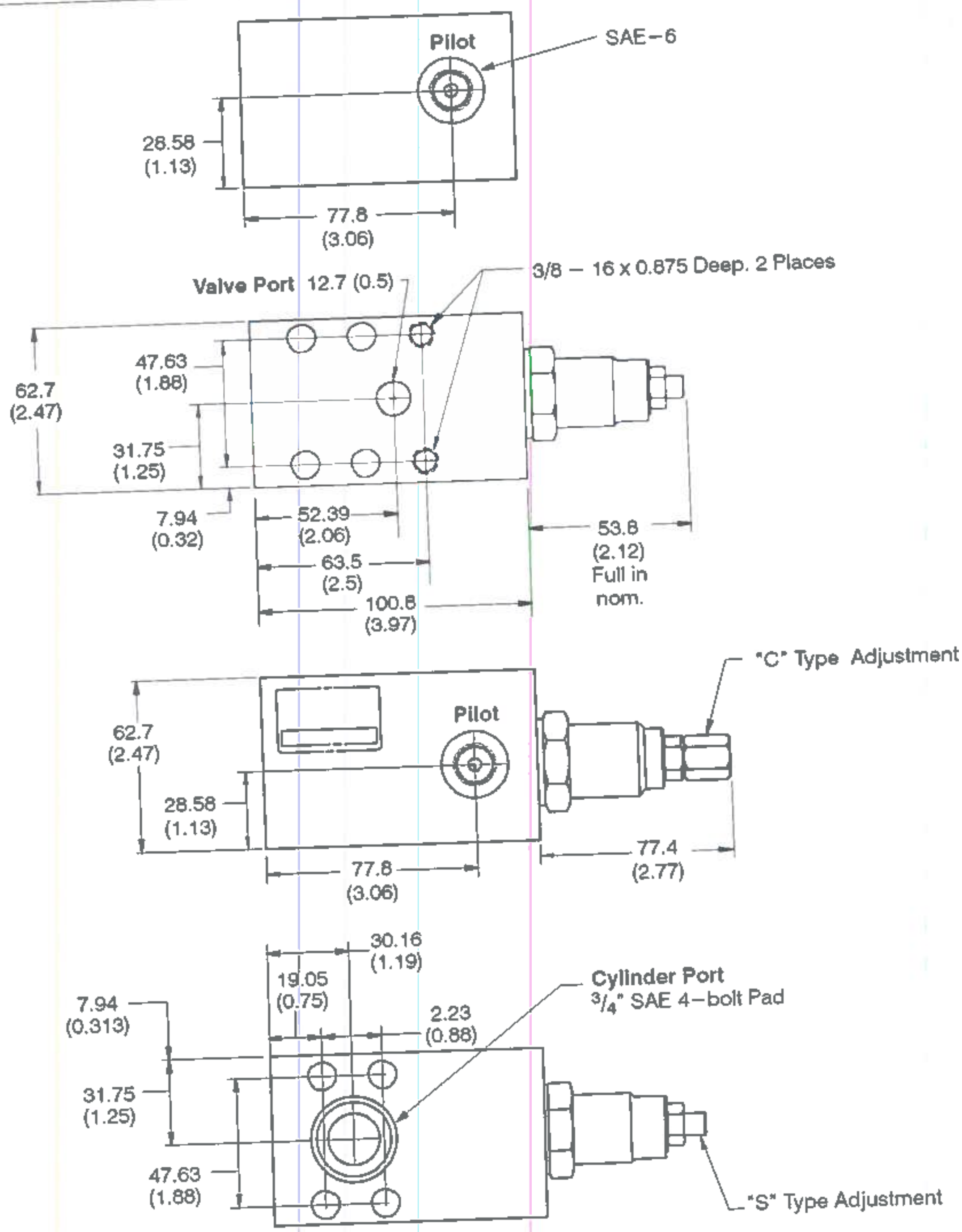
3/4" SAE 4-Bolt Pad Mounting

CBV*-12*-*-B

Functional Symbol



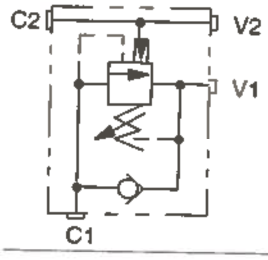
Dimensions
mm (inch)



Close Coupled Nipple Mounting

CBV*-12*-*-N

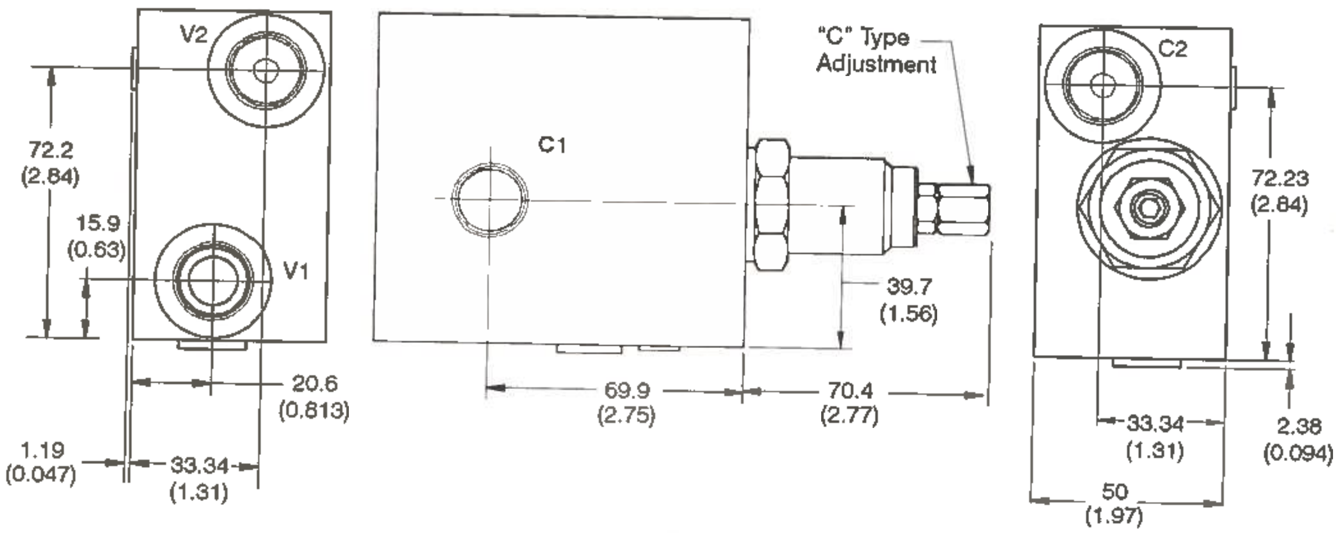
Functional Symbol



Dimensions

mm (inch)

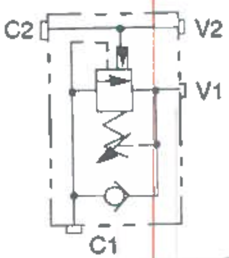
Port Size	C1	C2	V1	V2
8T	1/2" NPTF	SAE 8	SAE 8	SAE 8



Gasket Mounted – Single

CBV*-12*-*-G

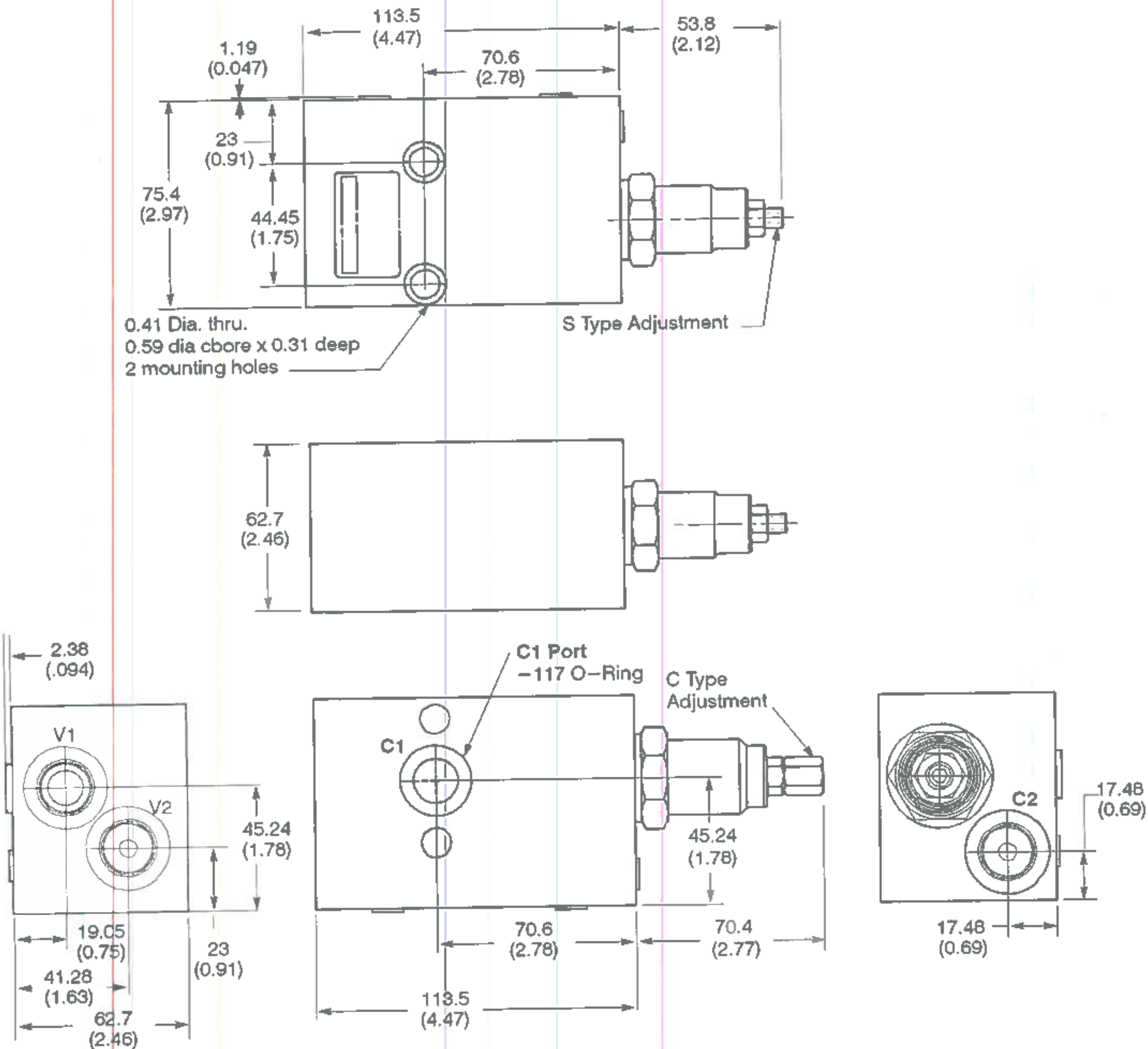
Functional Symbol



Dimensions

mm (inch)

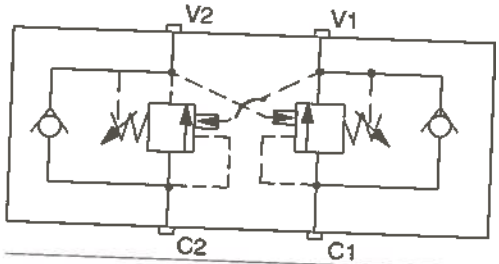
Port	C1	C2	V1	V2
8T	0.625 DIA	SAE 8	SAE 8	SAE 8
4G	0.625 DIA	1/2" BSPP	1/2" BSPP	1/2" BSPP



Dual Counterbalance Line Mounted

CBV*-12*-*-D

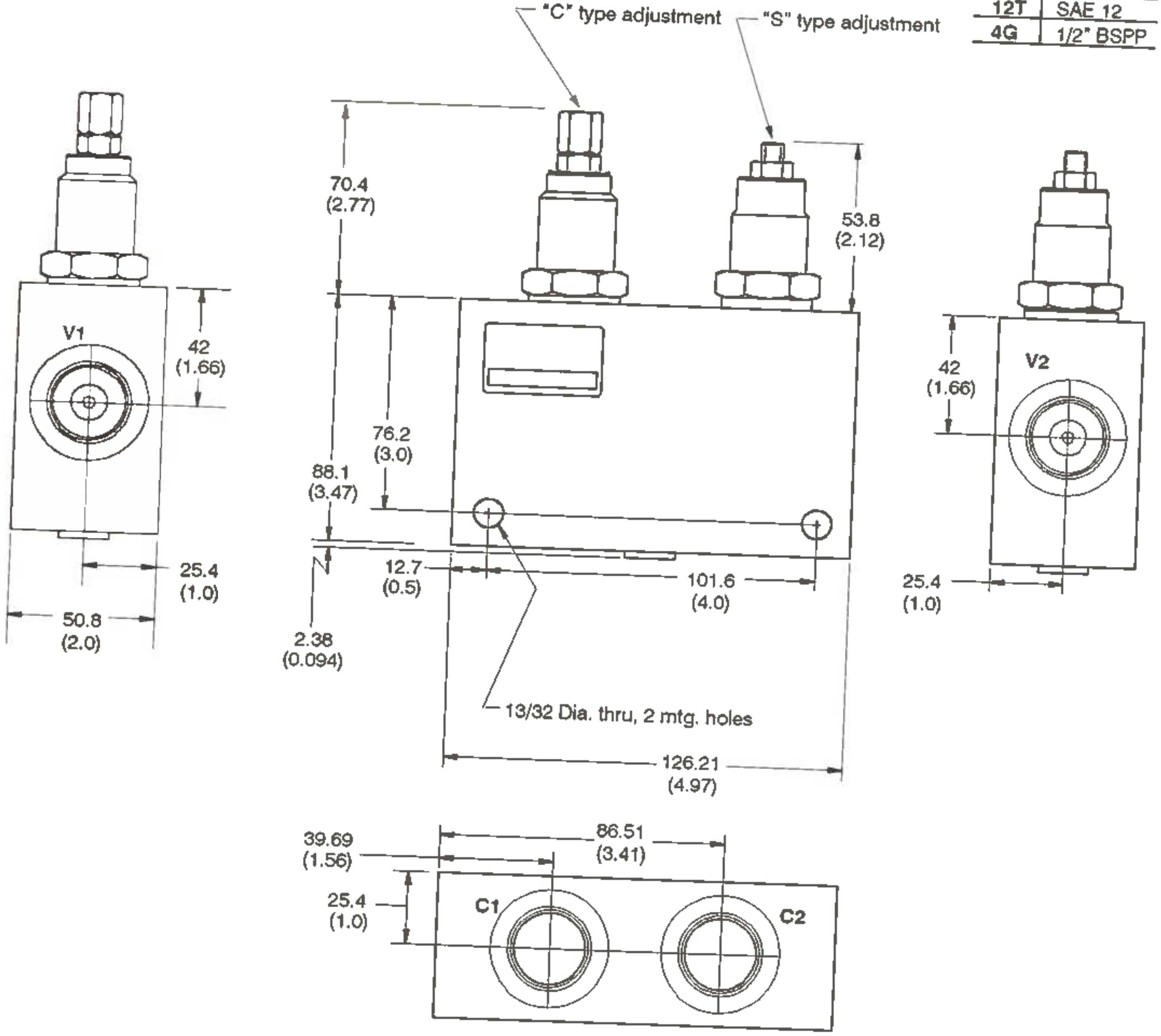
Functional Symbol



Dimensions

mm (inch)

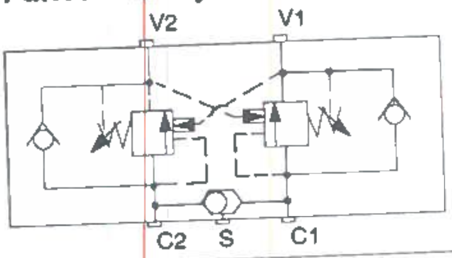
Port Size	C1, C2, V1, V2
10T	SAE 10
12T	SAE 12
4G	1/2" BSPP



Dual Counterbalance Line Mounted w/Integral Shuttle

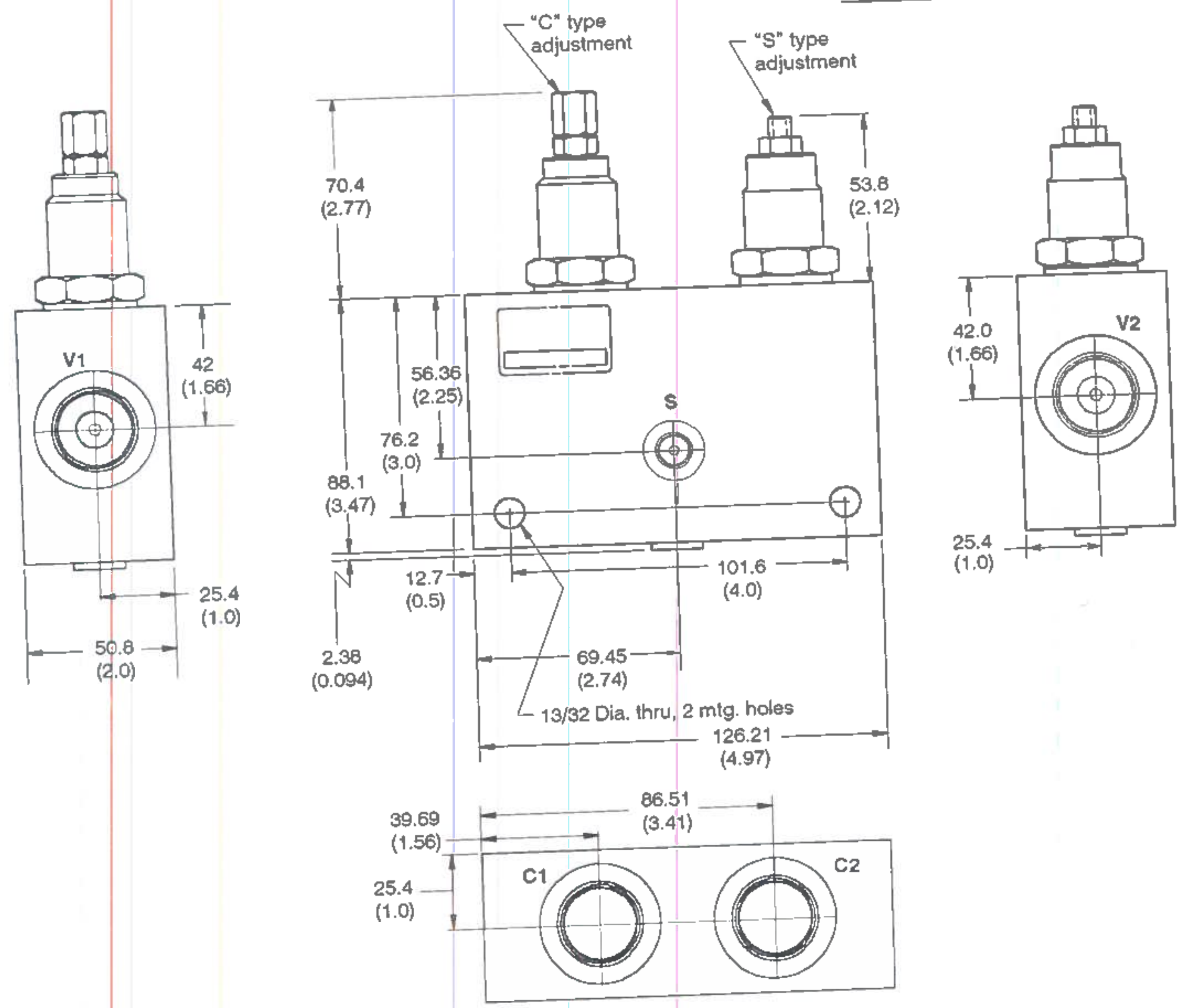
CBV*-12*-*-M

Functional Symbol



Dimensions
mm (inch)

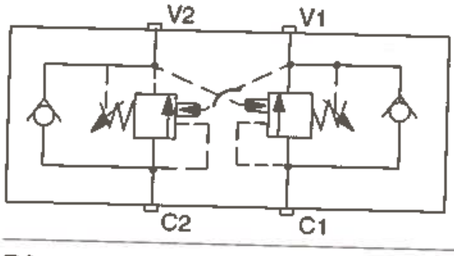
Port Size	C1, C2, V1, V2	S
10T	SAE 10	SAE 4
12T	SAE 12	SAE 4
4G	1/2" BSPP	1/4" BSPP



Dual Counterbalance Gasket Mounted

CBV*-12*-*-P

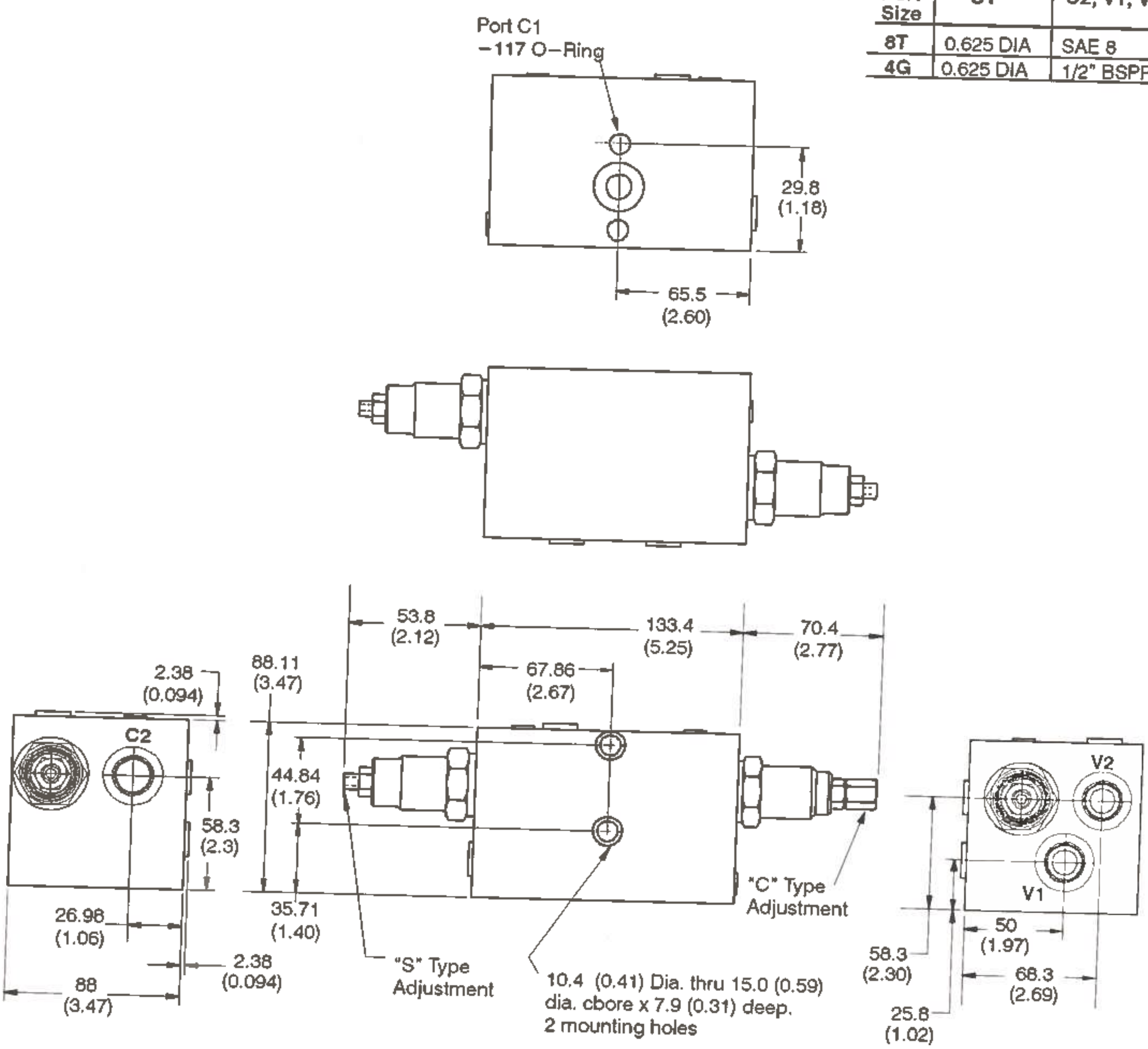
Functional Symbol



Dimensions

mm (inch)

Port Size	C1	C2, V1, V2
8T	0.625 DIA	SAE 8
4G	0.625 DIA	1/2" BSPP



Model Code

RV11 – 12* – * – * * * * – **/**

1 2 3 4 5 6 7 8 9 10

1 Function

RV – Relief Valve

2 Version

3 Size

12 – 12 Size

4 Seals

Blank – Buna "N"
V – Viton

5 Adjustment

S – Screw
C – Cap
K – Knob

6 Valve Housing Material

S – Steel
A – Aluminum

7 Port Size

O – Cartridge Only
4G – 1/2 " BSPP
6G – 3/4 " BSPP
10T – SAE 10
12T – SAE 12

8 Cavity

Blank – Cavity without undercut
U – Cavity with undercut

9 Pressure Range

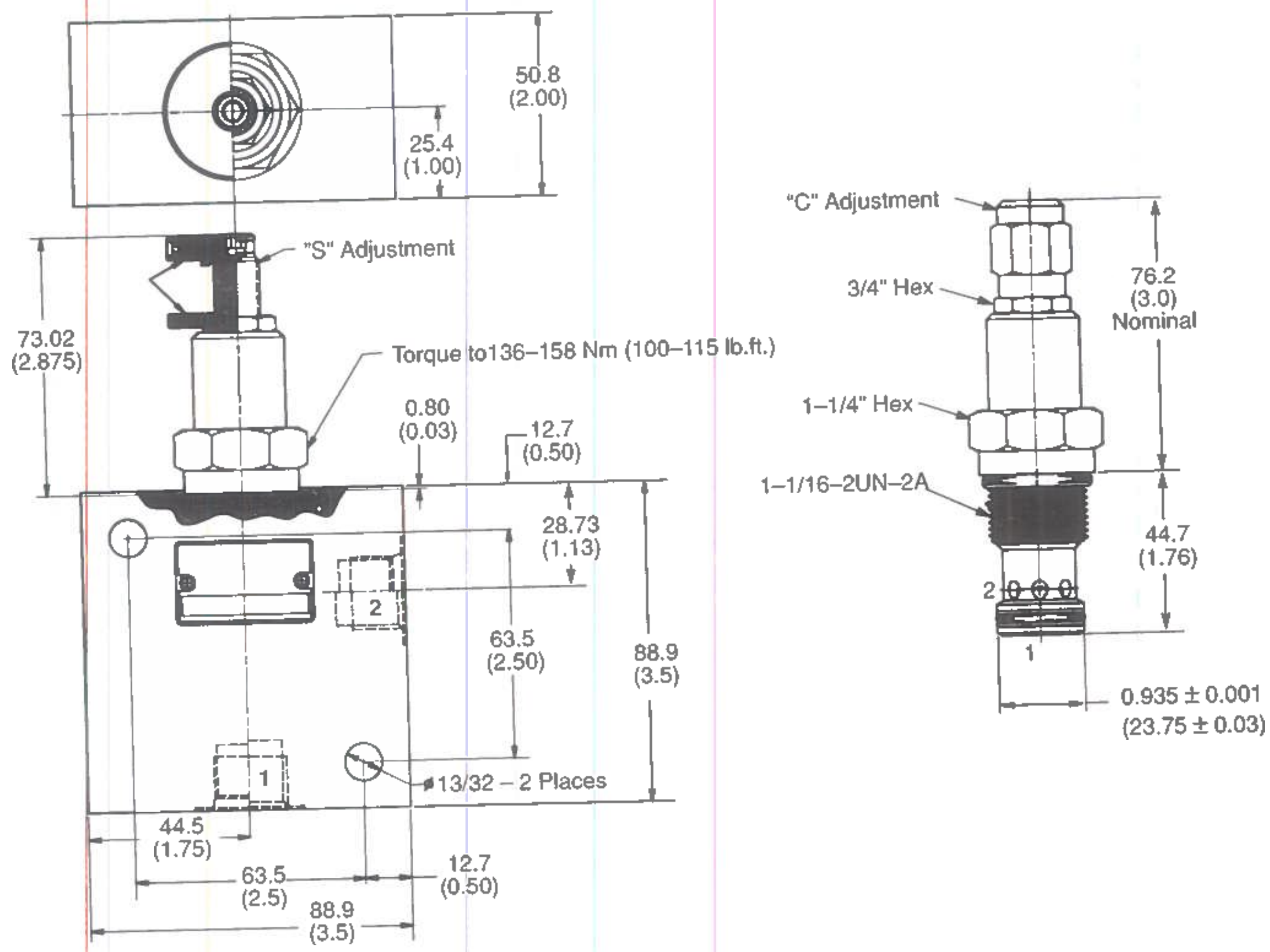
15 – 5–103 bar (75–1500 psi)
30 – 10–207 bar (150–3000 psi)
50* – 17–345 bar (250–5000 psi)

* Must be ordered as cartridge only or with an "S" (steel) valve body.

10 Factory Set Cracking Pressure

Within ranges in 9 above
Blank – Normal factory setting at approximate mid–range
User requested settings in 3.45 bar (50 psi) steps, coded as in the following examples:
10 – 68.9 bar (1000 psi)
10.5 – 72.4 bar (1050 psi)

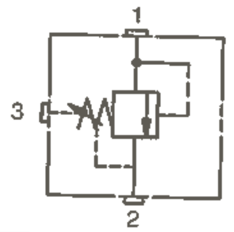
Dimensions



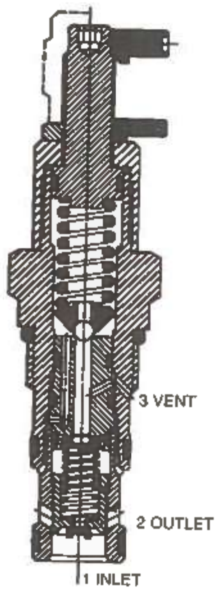
Relief Valve, Vented

VRV11-12

Functional Symbol

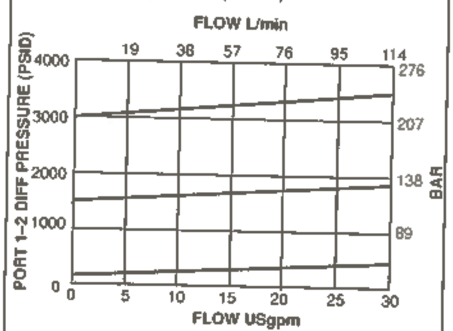


Sectional View



Pressure Override Characteristics

28 cSt (132 SSU) @ 38° C (100° F)



Description

The VRV11-12 is a pilot operated, sliding spool, adjustable, cartridge type vented relief valve. The valve is designed for use as a pressure limiting device in hydraulic circuits which can be operated remotely. The sliding spool design smoothly regulates pressure in any hydraulic system and provides low hysteresis.

Operation

In its normally closed state, the valve allows flow from Port 1 to Port 2 when Port 3 is vented, or the main spring settting is achieved.

Features

- NFPA fatigue and endurance rated for 345 bar (5000 psi) maximum pressure.
- All operating parts are hardened steel, ground, honed and lapped for long life and low leakage.
- Standard bodies available in aluminum or steel.
- Cartridge design for maximum flexibility and minimal manifold space requirements.
- Pilot operated design for fast response with low hysteresis.
- All exposed surfaces are plated to resist corrosion.
- High flow capability in a compact size.
- Desired setting may be locked down.
- Aluminum knob option available.

Ratings

Maximum pressure	345 bar (5000 psi) 137 bar (20,000 psi) burst pressure
Sequence crack pressure ranges	75-1500, 150-3000 & 250-5000 psi
Crack pressure set with	0.25 USgpm from port "1" to "2"
Reseat pressure	more than 90% of crack pressure
Hysteresis	less than 45 psi
Internal leakage	11.6 cu.in./min (189 ml/min) @80% crack press
Overshoot	less than 15% of max. press. range with flow step of 30 USgpm at pressure rise rate of 100,000 psi/sec
Repeatability	+/– 1% maximum pressure range
Rated flow	30 USgpm (114 L/min)
Operating media temperature range	–40° C to 120° C (–40° to 184° F)

Cavity

C-12-3S

Fluids

All general purpose hydraulic fluids such as MIL-H-5606, SAE 10, SAE 20, etc. Refer to Vickers data sheet I-286-S.
Fluid cleanliness ISO 4406, class 16/13 or cleaner

Mass, Cartridge Only

0.4kg (0.89 lb)

Model Code

VRV11 – 12* – * – *** – **/**

1 2 3 4 5 6 7 8 9

1 Function

VRV – Vented Relief Valve

2 Version

3 Size

12 – 12 Size

4 Size

Blank – Buna "N"
V – Viton

5 Adjustment

S – Screw
C – Cap
K – Knob

6 Valve Housing Material

S – Steel
A – Aluminum

7 Port Size

0 – Cartridge Only
4G – 1/2" BSPP
6G – 3/4" BSPP
10T – SAE 10
12T – SAE 12

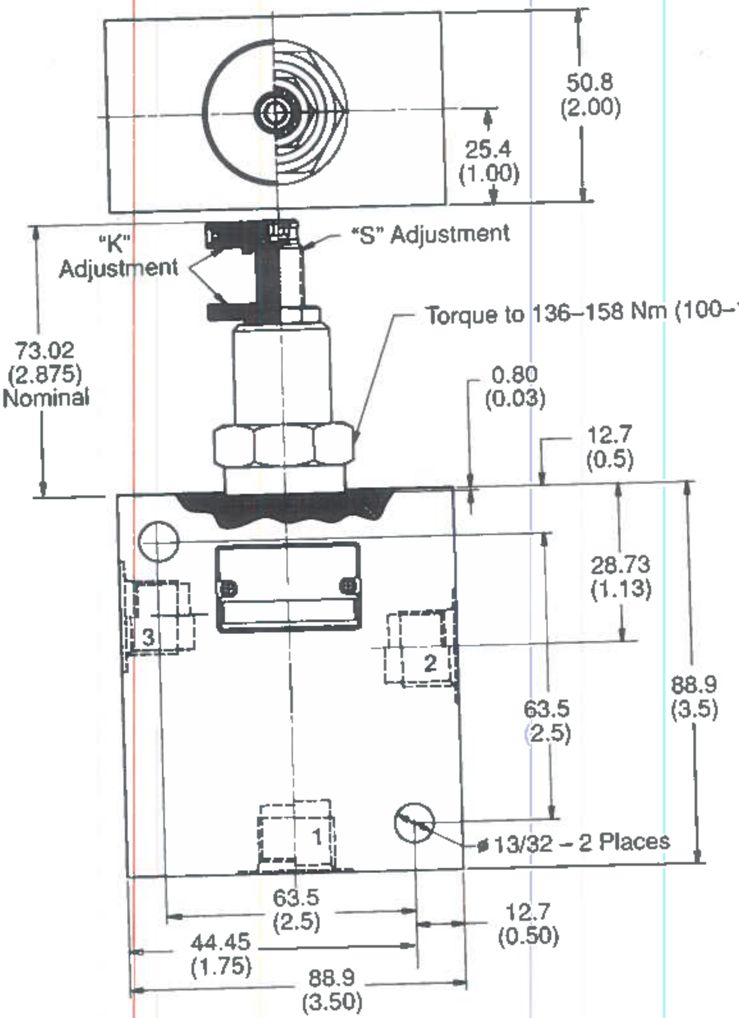
8 Pressure Range

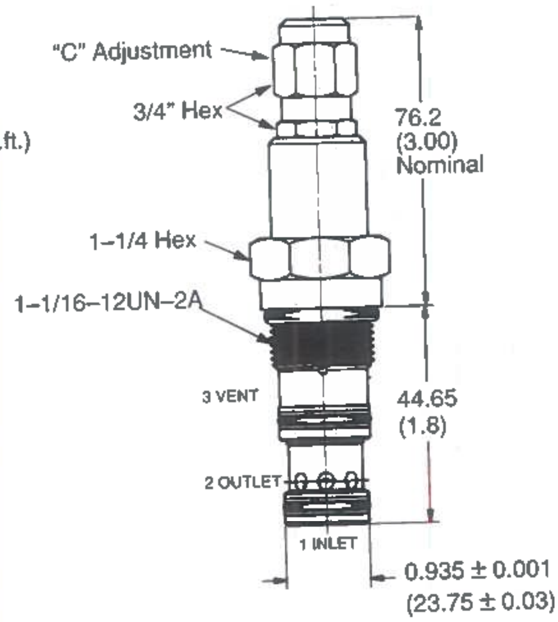
15 – 5–103 bar (75–1500 psi)
30 – 10–207 bar (150–3000 psi)
50* – 17–345 bar (250–5000 psi)
* Must be ordered as cartridge only or with an "S" (steel) valve body.

9 Factory Set Cracking Pressure

Within ranges in 8 above
Blank – Normal factory setting at approximate mid–range
User requested settings in 3.45 bar (50 psi) steps, coded as in the following examples:
10 – 68.9 bar (1000 psi)
10.5 – 72.4 bar (1050 psi)

Dimensions

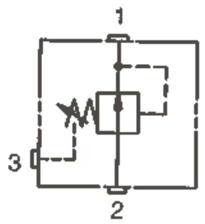




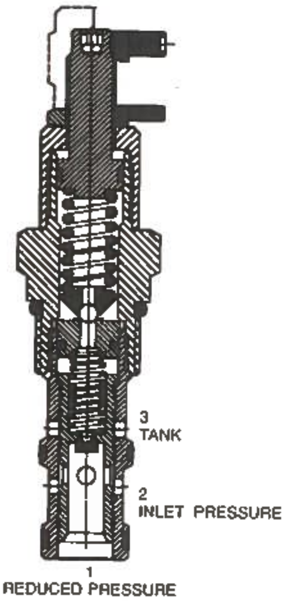
Pressure Reducing Valve, Pilot Operated

PRV11-12

Functional Symbol

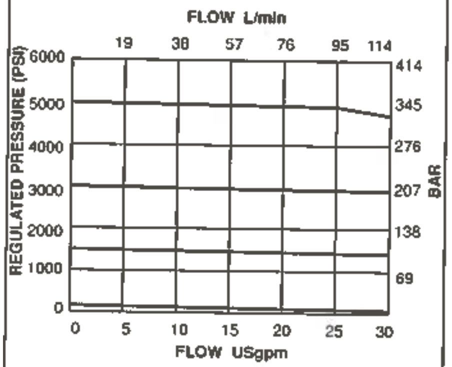


Sectional View



Reduced Pressure Characteristics

28cSt (132 SSU) @ 38° C (100° F)



Description

The PRV11-12 is a screw-in cartridge type , pilot operated, sliding spool, adjustable pressure reducing valve.

Operation

The PRV11-12 is normally open, allowing flow from Port 2 to Port 1 (Port 3 must be vented). Once the pressure setting is reached at Port 1, the spool shifts to restrict the inlet flow at Port 2, which regulates the pressure at Port 1.

Features

- NFPA fatigue and endurance rated for 345 bar (5000 psi) maximum pressure.
- All operating parts are hardened steel, ground, honed and lapped for long life and low leakage.
- Standard bodies available in aluminum or steel.
- Cartridge design for maximum flexibility and minimal manifold space requirements.
- Pilot operated design for fast response with low hysteresis.
- All exposed surfaces are plated to resist corrosion.
- High flow capability in a compact size.
- Desired setting may be locked down.
- Aluminum knob option available.

Ratings

Maximum pressure	345 bar (5,000 psi) max.
Rated flow	114 L/min (30 USgpm)
Reduced pressure adjustment range	See "Model Code"
Internal leakage	189 ml/min (11.6 cu. in.)
Reduced pressure characteristics	See "Reduced Press. Characteristics"
Operating media temperature range	–40° to 120° C (–40° to 248° F)

Cavity

C-12-3S

Fluids

All general purpose hydraulic fluids such as MIL-H-5606, SAE 10, SAE 20, etc. Refer to Vickers data sheet I-286-S.

Fluid cleanliness ISO 4406, class 16/13 or cleaner

Mass, Cartridge Only

0.4kg (0.89 lb)

Model Code

PRV11 – 12* – * – * – **/****

[1] [2] [3][4] [5] [6][7] [8] [9]

[1] Function
PRV – Pressure Reducing Valve

[2] Version

[3] Size
12 – 12 Size

[4] Seals
Blank – Buna "N"
V – Viton

[5] Adjustment
S – Screw
C – Cap
K – Knob

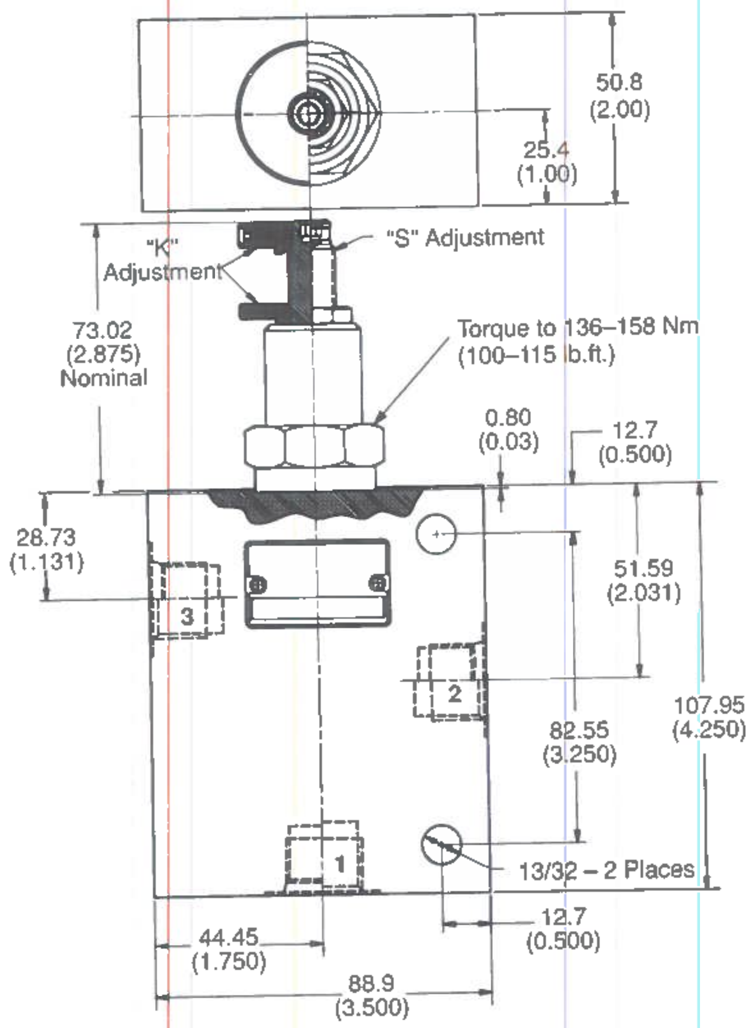
[6] Valve Housing Material
S – Steel
A – Aluminum

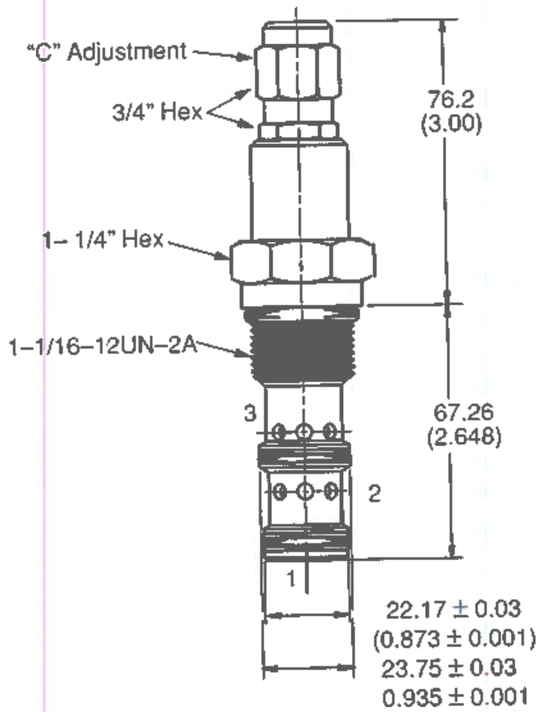
[7] Port Size
0 – Cartridge only
4G – $^1/_2$" BSPP
6G – $^3/_4$" BSPP
10T – SAE 10
12T – SAE 12

[8] Pressure Range
15 – 10–103 bar (150–1500 psi)
30 – 17–207 bar (250–3000 psi)
50* – 24–345 bar (350–5000 psi)
* Must be ordered with steel valve body

[9] Factory Set Reduced Pressure
Within ranges in [8] above
Blank – Normal factory setting at approximate mid–range
User requested settings in 3.45 bar (50 psi) steps, coded as in the following examples:
10 – 68.9 bar (1000 psi)
10.5 – 72.4 bar (1050 psi)

Dimensions

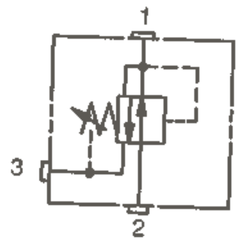




Pressure Reducing/Relieving Valve

PRV12–12

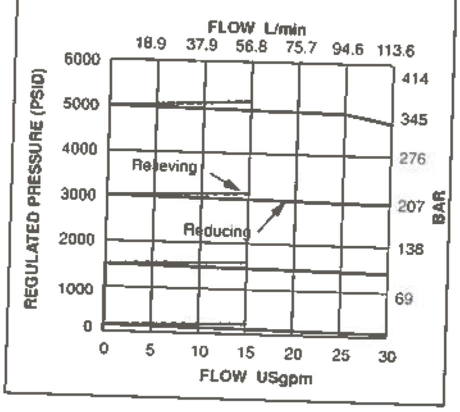
Functional Symbol



Sectional View

Reduced Pressure Characteristics

28 cSt (132 SSU) @ 38° C (100° F)



Description

The PRV12-12 is a pilot operated, sliding spool, adjustable cartridge type pressure reducing and relieving valve. This valve maintains a constant secondary (lower) pressure in hydraulic subsystems regardless of pressure variations in the primary system. In addition to the reducing function, this valve also provides a flow path from the reduced pressure port to the tank port. If pressure in the secondary circuit exceeds the desired pressure, the valve opens this flow path to relieve excess pressure to tank

Operation

The PRV12-12 is normally open, allowing flow from Port 2 to Port 1 (Port 3 must be vented). Once the pressure setting is reached at Port 1, the spool shifts to restrict the inlet flow at port 2, which regulates the pressure at Port 1. If pressure at Port 1 exceeds the predetermined settting of the valve, the spool will shift further and relieve excess pressure through Port 3.

Features

- NFPA fatigue and endurance rated for 345 bar (5000 psi) maximum pressure.
- All operating parts are hardened steel, ground, honed and lapped for long life and low leakage.
- Standard bodies available in aluminum or steel.
- Pilot operated design for fast response with low hysteresis
- Cartridge design for maximum flexibility and minimal manifold space requirements.
- All exposed surfaces are plated to resist corrosion.
- High flow capability in a compact size.
- Desired setting may be locked down.
- Aluminum knob option available.

Ratings

Maximum pressure	345 bar (5000 psi) Port 2 to 1 @ 57 L/min (15 USgpm) 207 bar (3000 psi) Port 2 to 1 @ 114 L/min (30 USgpm)
Reduced pressure adjustment range	See "Model Code"
Rated flow	114 L/min (30 USgpm)
Internal leakage	1.0 L/min (0.30 USgpm)
Reduced press. characteristics	See "Reduced Press. Characteristics"
Operating media temperature range	–40° to 120° C (–40° to 248° F)

Cavity

C-12-3

Fluids

All general purpose hydraulic fluids such as MIL-H-5606, SAE 10, SAE 20, etc. Refer to Vickers data sheet I-286-S.

Fluid cleanliness ISO 4406, class 16/13 or cleaner

Mass, Cartridge Only

0.4kg (0.89 lb)

Model Code

PRV12 – 12* – * – *** – **/**

[1] [2] [3] [4] [5] [6] [7] [8] [9]

[1] Function
PRV – Pressure Reducing Valve

[2] Version

[3] Size
12 - 12 Size

[4] Seals
Blank – Buna "N"
V – Viton

[5] Valve Housing Material
S – Steel
A – Aluminum

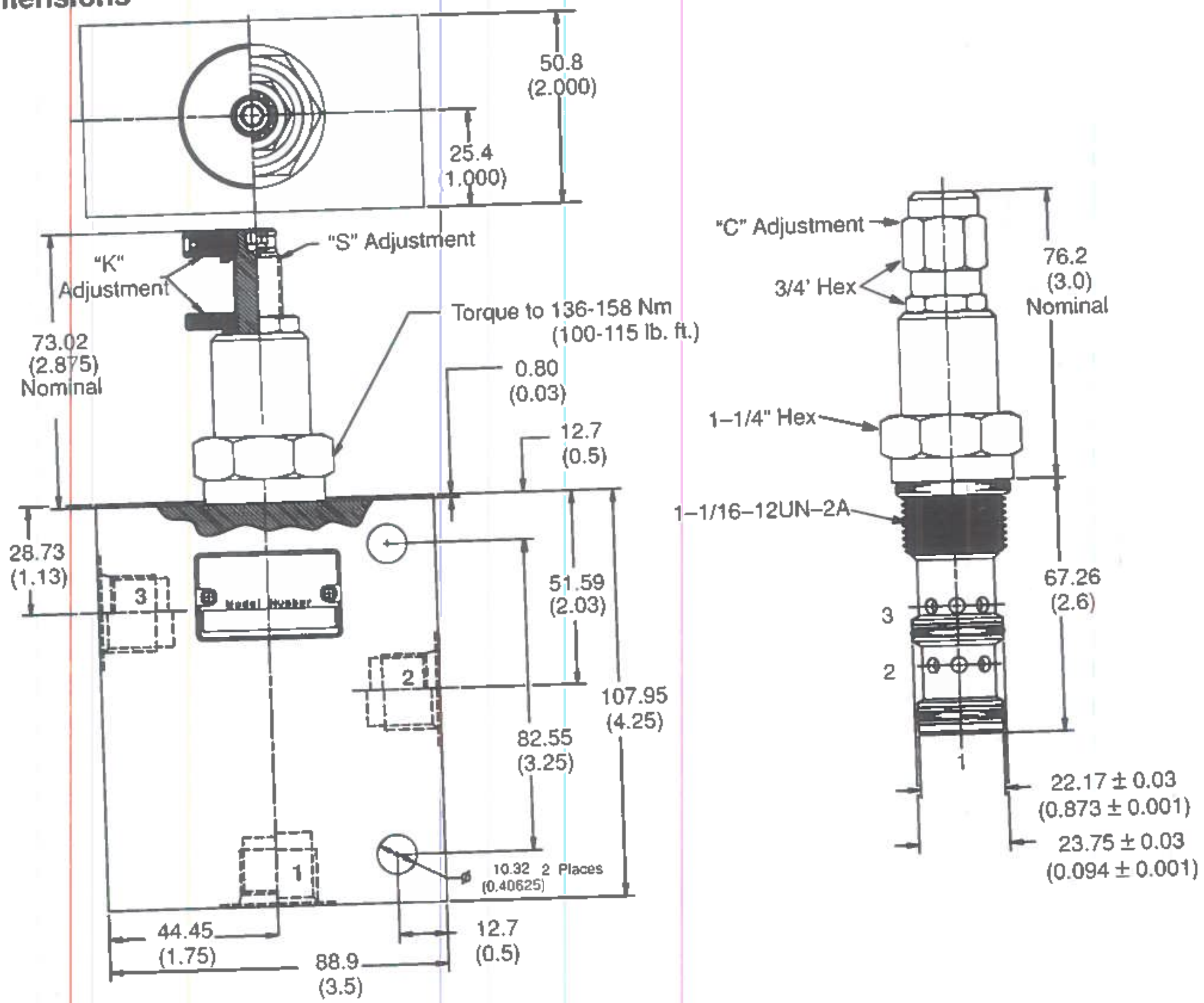
[6] Adjustment
S – Screw
C – Cap
K – Knob

[7] Port Size
4G – ½ " BSPP
6G – ¾ " BSPP
10T – SAE 10
12T – SAE 12

[8] Pressure Range
15 – 10–103 bar (150–1500 psi)
30 – 17–207 bar (250–3000 psi)
50* – 24–345 bar (350–5000 psi)
* Must be ordered as a cartridge only or with an "S" (Steel) valve body

[9] Factory Set Reduced Pressure
Within ranges in [8] above
Blank – Normal factory setting at approximate mid–range
User requested settings in 3.45 bar (50 psi) steps, coded as in the following examples:
10 – 68.9 bar (1000 psi)
10.5 – 72.4 bar (1050 psi)

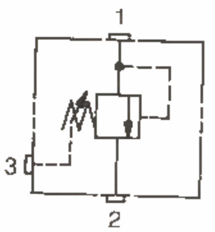
Dimensions



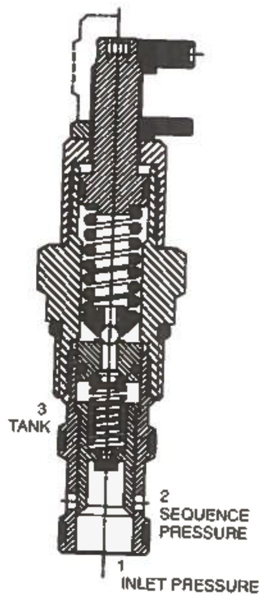
Pressure Sequence Valve, Internally Piloted

PSV11-12

Functional Symbol

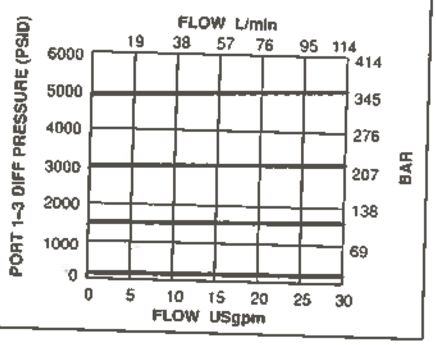


Sectional View



Sequence Pressure Override Characteristics

28 cSt (132 SSU) @ 38° C (100° F)



Description

The PSV11-12 is a pilot operated, sliding spool, adjustable, cartridge type pressure sequence valve. This valve, which is internally piloted, controls the sequence of operations of two or more actuators.

Operation

The PSV11-12 valve remains normally closed until a predetermined pressure is reached at port 1, which then allows flow to port 2 (port 3 must be vented).

Features and Benefits

- NFPA fatigue and endurance rated for 345 bar (5000 psi) maximum pressure.
- All operating parts are hardened steel, ground, honed and lapped for long life and low leakage.
- Standard bodies available in aluminum or steel.
- Cartridge design for maximum flexibility and minimal manifold space requirements.
- Pilot operated design for fast response with low hysteresis.
- All exposed surfaces are plated to resist corrosion.
- High flow capability in a compact size.
- Desired setting may be locked down.
- Aluminum knob option available.

Ratings

Maximum pressure	345 bar (5000 psi)
Sequence crack pressure ranges	75-1500, 150-3000 & 250-5000 psi
Crack pressure set with	0.25 USgpm from port "1" to "2"
Reseat pressure	more than 90% of crack pressure.
Hysteresis	less than 45 psi
Internal leakage	11.6 cu.in./min (189 ml/min) @80% crack press.
Overshoot	less than 15% of max. press. range with flow step of 30 USgpm at pressure rise rate of 100,000 psi/sec.
Repeatability	+/– 1% maximum pressure range
Rated flow	30 USgpm (114 L/min)
Operating media temperature range	–40° to 120° C (–40° to 248° F)

Cavity

C-12-3S

Fluids

All general purpose hydraulic fluids such as MIL-H-5606, SAE 10, SAE 20, etc. Refer to Vickers data sheet I-286-S.
Fluid cleanliness ISO 4406, class 16/13 or cleaner

Mass, Cartridge Only

0.4 kg (0.89 lb)

Model Code

$\underbrace{\text{PSV}}_{1}\underbrace{\text{11}}_{2} - \underbrace{\text{12}}_{3}\,\underbrace{*}_{4} - \underbrace{*}_{5} - \underbrace{*}_{6}\underbrace{**}_{7} - \underbrace{**}_{8}/\underbrace{**}_{9}$

1 Function
PSV – Pressure sequence valve

2 Version

3 Size
12 – Size 12

4 Seals
Blank – Buna "N"
V – Viton

5 Adjustment
S – Screw
C – Cap
K – Knob

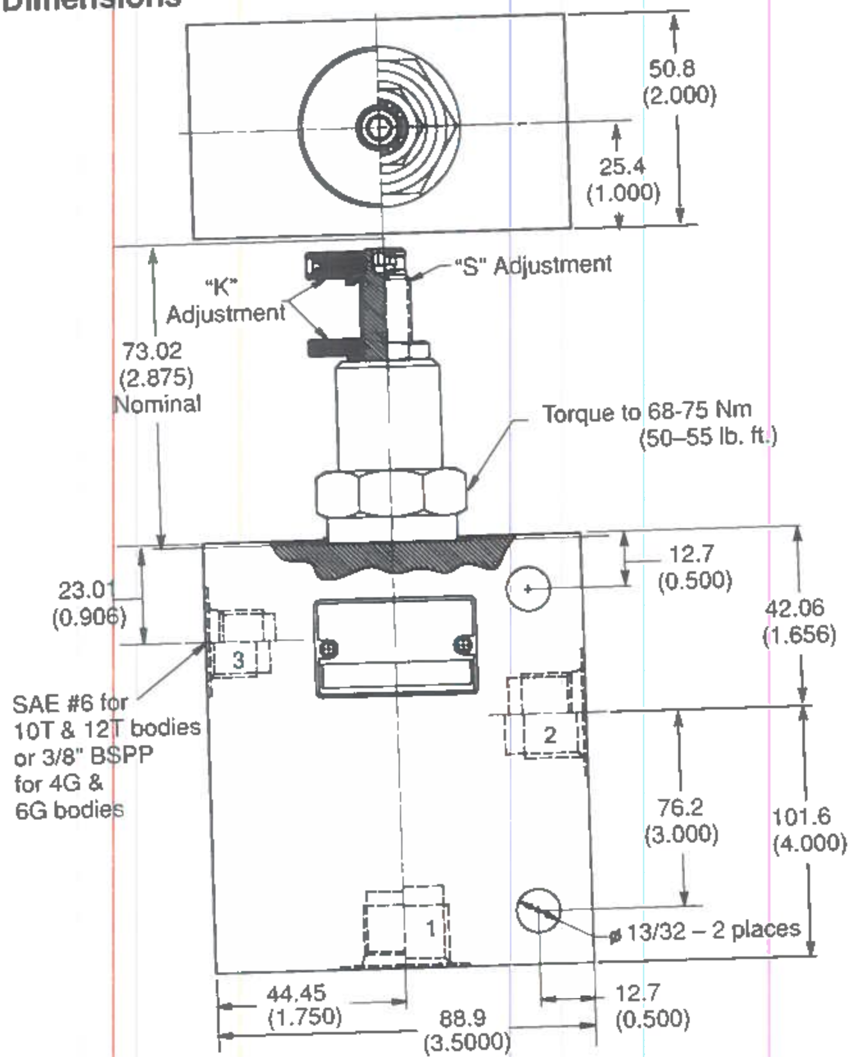
6 Valve Housing Material
S – Steel
A – Aluminum

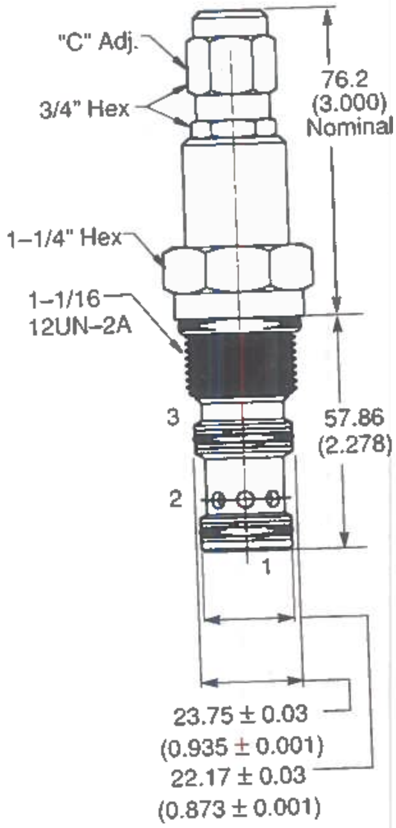
7 Port Size
O – Cartridge only
4G – 1/2 " BSPP
6G – 3/4 " BSPP
10T – SAE 10
12T – SAE 12

8 Pressure Range
15 – 5–104 bar (150–1500 psi)
30 – 10–207 bar (250–3000 psi)
50* –17–345 bar (350–5000 psi)
* Must be ordered as a cartridge only or with an "S" (Steel) valve body.

9 Factory Set Cracking Pressure
Within ranges in 8 above
Blank – Normal factory setting at approximate mid–range
User requested settings in 3.45 bar (50 psi) steps, coded as in the following examples:
10 – 68.9 bar (1000 psi)
10.5 – 72.4 bar (1050 psi)

Dimensions

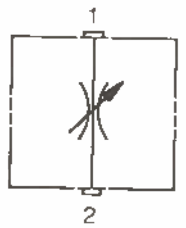




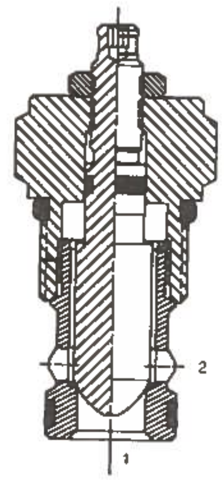
Flow Control Valve

FCV11-12

Functional Symbol

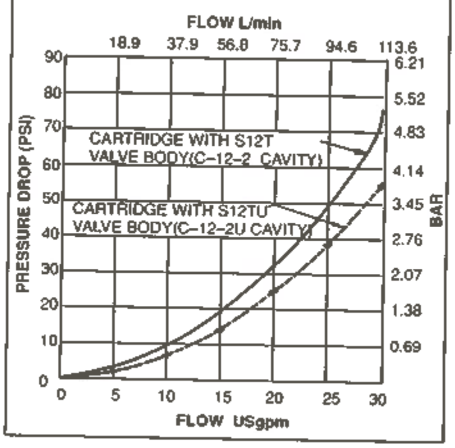


Sectional View



Pressure Drop Characteristics

28 CST (132 SSU) @ 38° C (100° F)



Description

The FCV11-12 is a screw-in cartridge type, direct acting, adjustable needle valve.

Operation

This valve is non-pressure compensated. Flow is controlled in either direction, from full flow to tight shut-off, by turning the adjustment feature clockwise.

Features

- NFPA fatigue and endurance rated for 345 bar (5000 psi) maximum pressure.
- All operating parts are hardened steel, ground, honed and lapped for long life and low leakage.
- Standard bodies available in aluminum or steel.
- Cartridge design for maximum flexibility and minimal manifold space requirements.
- All exposed surfaces are plated to resist corrosion.
- High flow capability in a compact size.
- Desired setting may be locked down.
- Aluminum knob option available.

Ratings

Maximum pressure .... 345 bar (5000 psi)

Rated flow .... 114 L/min (30 USgpm)

Internal leakage .... 5 drops/min @ 345 bar (5000 psi)

Pressure drop characteristics .... 95 L/min (25 USgpm) @ 3500 psid

Operating media temperature range ...... –40° C to 120° C (40° F to 184° F)

Cavity

C-12-2, C-12-2U

Fluids

All general purpose hydraulic fluids such as MIL-H-5606, SAE 10, SAE 20, etc. Refer to Vickers data sheet I-286-S.

Fluid cleanliness ISO 4406, class 16/13 or cleaner

Mass, Cartridge Only

0.24 kg (0.54 lb)

Model Code

FCV11 – 12* – * – * * * * – NV

1 2 3 4 5 6 7 8 9

1 Function
FCV – Flow Control Valve

2 Version

3 Size
12 – 12 Size

4 Seals
Blank – Buna "N"
V – Viton

5 Adjustment
S – Screw

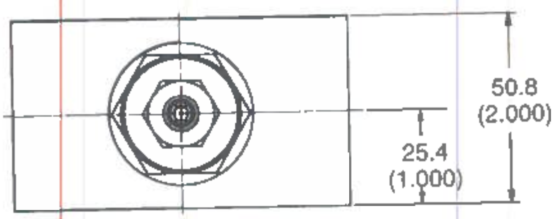
6 Valve Housing Material
S – Steel*
A – Aluminum
* For operating pressures above 207 bar (3000 psi)

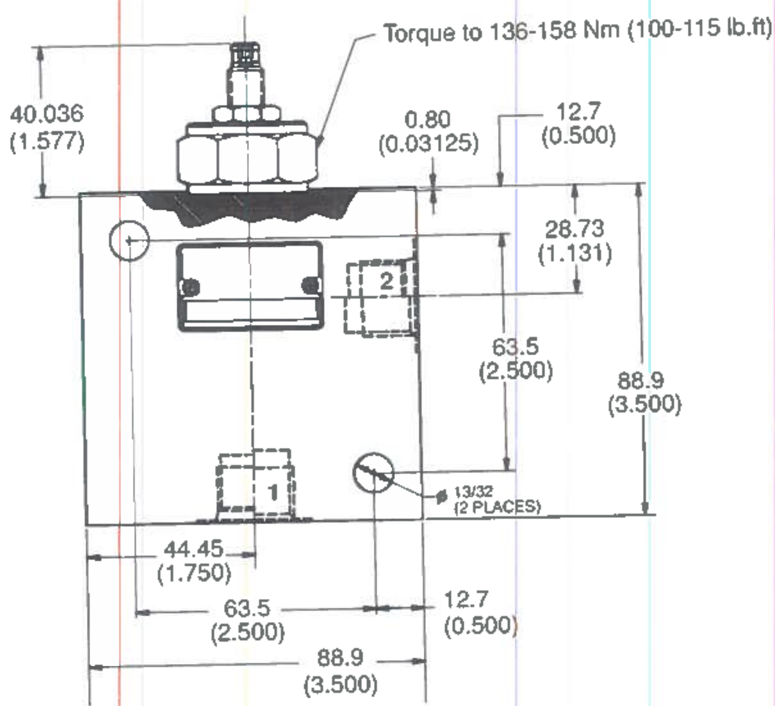
7 Port Size
O – Cartridge Only
4G – $^1/_2$" BSPP
6G – $^3/_4$" BSPP
10T – SAE 10
12T – SAE 12

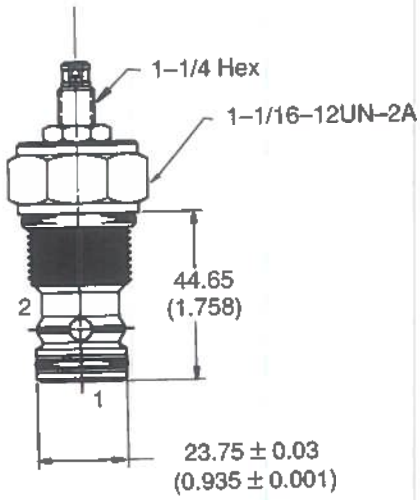
8 Cavity
Blank – Cavity without undercut
U – Cavity with undercut

9 Valve Type
NV – Needle Valve (Adjustable)

Dimensions



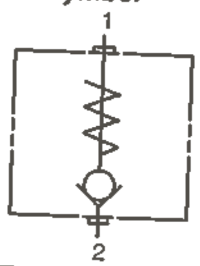




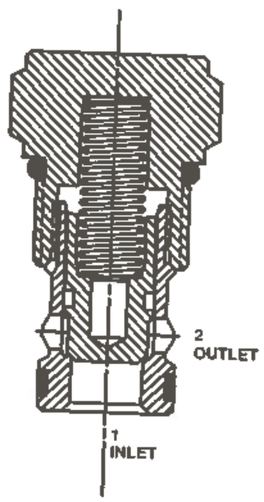
Check Valve

CV11-12

Functional Symbol

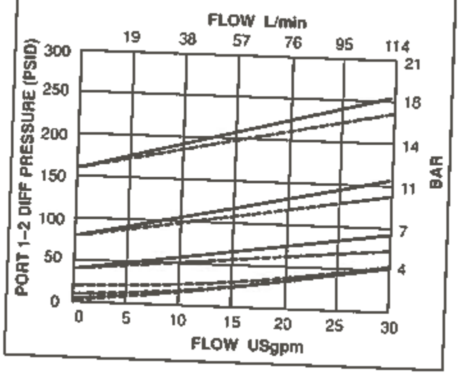


Sectional View



Pressure Drop Characteristics

28 cSt (132 SSU) @ 38° C (100° F)



Description

The CV11-12 is a cartridge type, direct acting, poppet style, hydraulic check valve. This valve is used to block flow or as a load holding device.

Operation

This check valve allows flow from Port 1 to Port 2 once the spring bias is overcome and will not allow flow in the reverse direction.

Features

- NFPA fatigue and endurance rated for 345 bar (5000 psi) maximum pressure.
- All operating parts are hardened steel, ground, honed and lapped for long life and low leakage.
- Standard bodies available in aluminum or steel.
- Cartridge design for maximum flexibility and minimal manifold space requirements.
- All exposed surfaces are plated to resist corrosion.
- High flow capability in a compact size.
- Desired setting may be locked down.
- Aluminum knob option available.

Ratings

Maximum pressure	345 bar (5000 psi)
Rated flow	See "Pressure Drop Characteristics"
Internal leakage	5 drops/min at 345 bar (5000 psi)
Pressure drop characteristics	See "Pressure Drop Characteristics"
Reseat pressure	more than 90% of crack pressure
Crack pressures	0.17 bar (2.5 psi) 0.35 bar (5.0 psi) 0.69 bar (10.0 psi) 1.38 bar (20.0 psi) 2.75 bar (40.0 psi) 5.5 bar (80.0 psi) 11 bar (160 psi)
Hysteresis	less than 45 psi
Operating media temperature range	–40° to 120° C (–40° to 184° F)

Cavity

C-12-2 or C-12-2U

Fluids

All general purpose hydraulic fluids such as MIL-H-5606, SAE 10, SAE 20, etc. Refer to Vickers data sheet I-286-S.

Fluid cleanliness ISO 4406, class 16/13 or cleaner

Mass, Cartridge Only

0.24 kg (0.54 lb)

Model Code

CV11 – 12* – P – * * * * – **

1 2 3 4 5 6 7 8 9

1 **Function**
CV – Check Valve

2 **Version**

3 **Size**
12 – 12 Size

4 **Seals**
Blank – Buna "N"
V – Viton

5 **Style**
P – Poppet

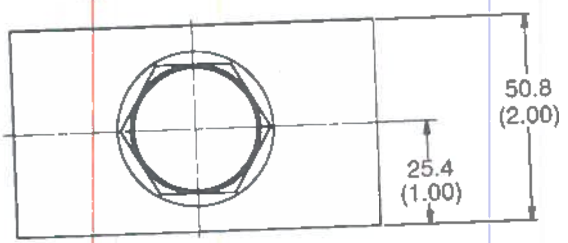
6 **Valve Housing Material**
S – Steel*
A – Aluminum
* For operating pressures above 207 bar (3000 psi)

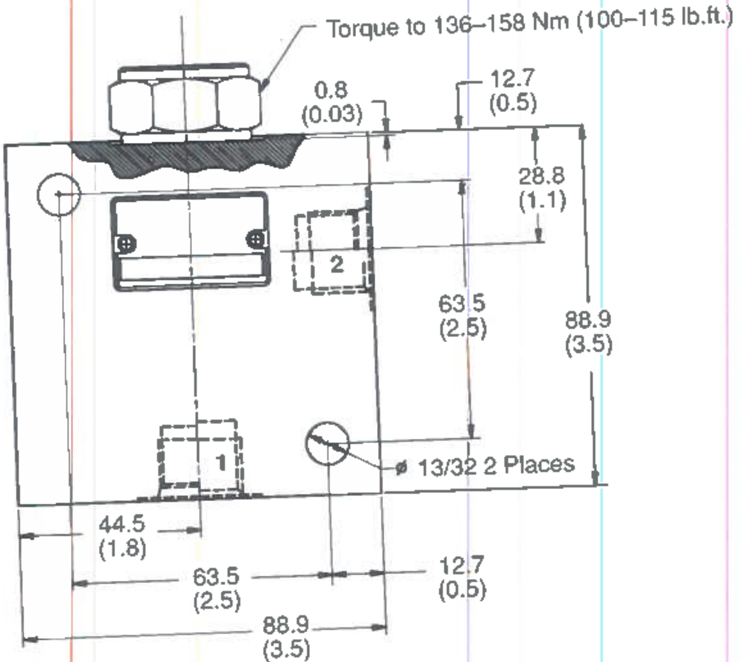
7 **Port Size**
O – Cartridge Only
4G – $^1/_2$ " BSPP
6G – $^3/_4$ " BSPP
10T – SAE 10
12T – SAE 12

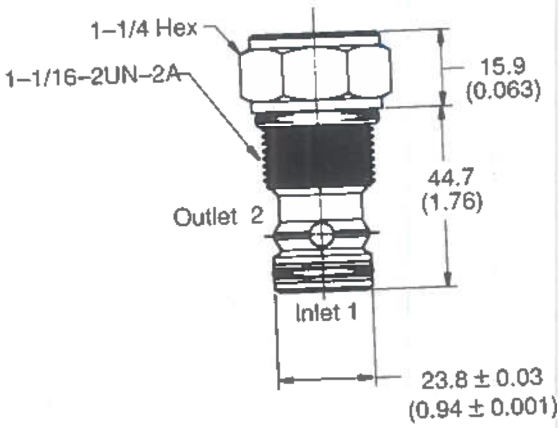
8 **Cavity**
Blank – Cavity without undercut
U – Cavity with undercut

9 **Cracking Pressure**
2.5 – 0.17 bar (2.5 psi)
5.0 – 0.35 bar (5.0 psi)
10 – 0.69 bar (10.0 psi)
20 – 1.38 bar (20.0 psi)
40 – 2.75 bar (40.0 psi)
80 – 5.5 bar (80.0 psi)
160 – 11 bar (160 psi)

Dimensions



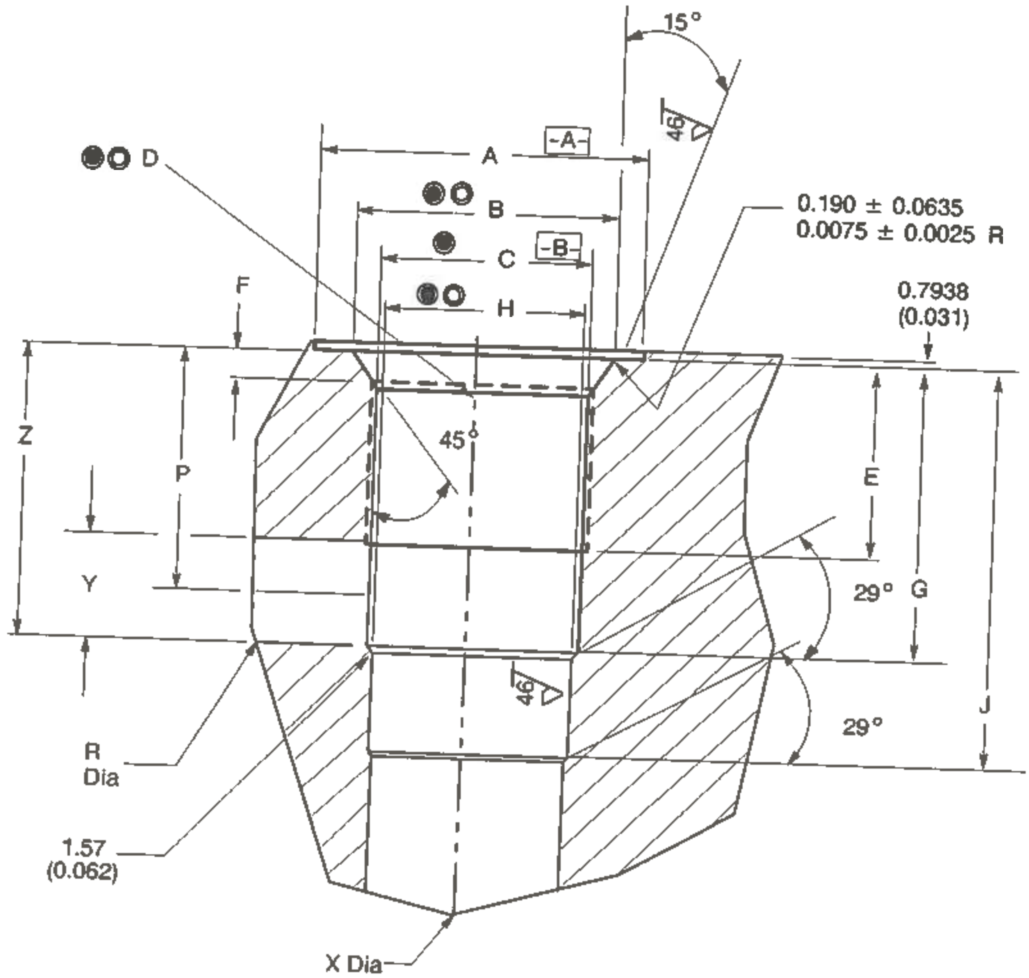




Standard Cavity Dimensions

C-12-2, 2-Way Cavity

mm (inch)



Cavity

Cavity	A Spotface	B .002	C .002	D Thread thd. class 2B	E Full Thread	F	G	H ± .001	J	P
C-12-2	38.1 (1.5000)	29.160 (1.148)	24.765 (0.975)	26.988 (1 1/16-12)	22.225 (0.875)	3.302/3.683 (0.130/0.145)	34.925 (1.375)	23.825 (0.938)	46.355 (1.825)	27.94 (1.100)

R Max. Dia.	X Max. Dia.	Y Max. Dia.	Z Max. Dia.
12.7 (0.500)	22.225 (0.875)	12.7 (0.500)	34.29 (1.350)

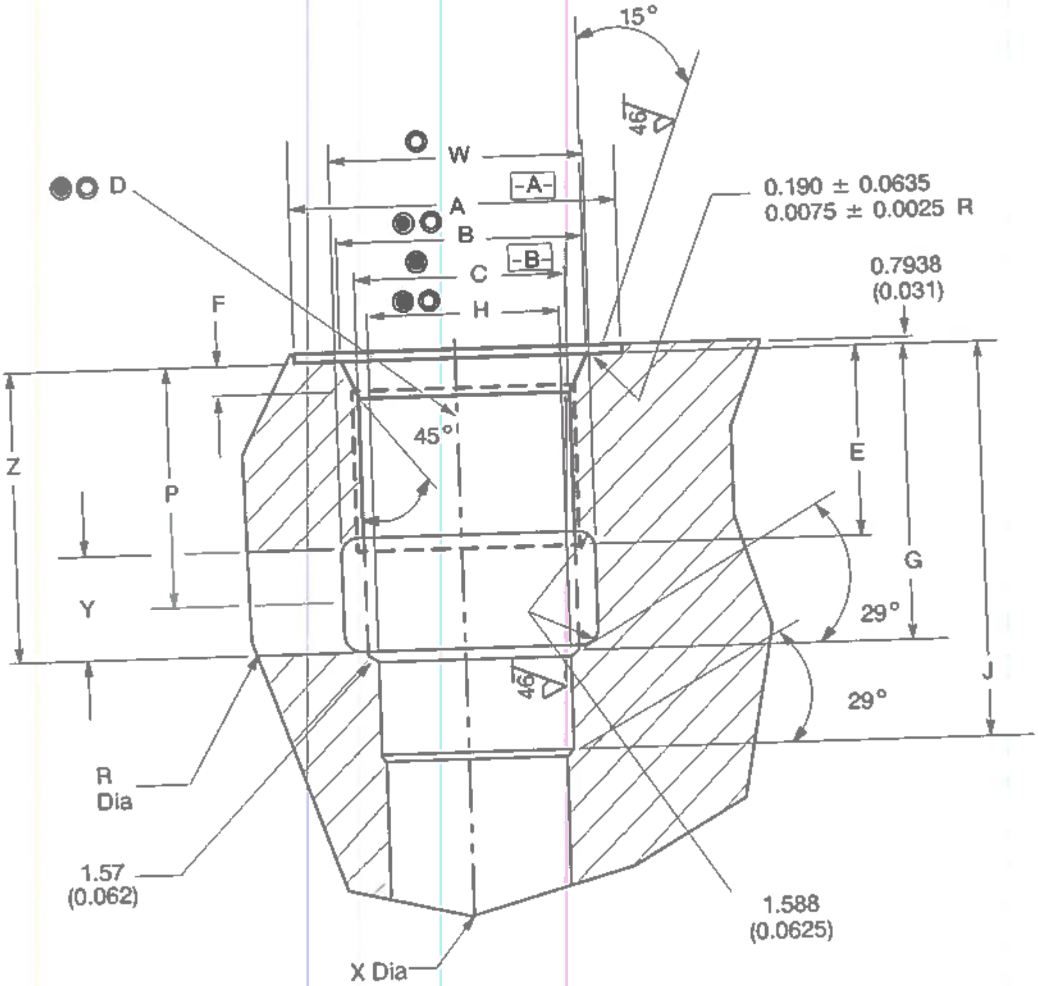
◉ These diameters ↗ .0508 mm (.002 inch) B unless otherwise specified.

◎ These diameters ⊥ .0254 mm (.001 inch) A unless otherwise specified.

Standard Cavity Dimensions

C-12-2U, 2-Way Cavity, with Undercut

mm (inch)



Cavity

Cavity	A Spotface	B .002	C .002	D Thread thd. class 2B	E Full Thread	F	G	H ± .001	J	P
C-12-2U	38.1 (1.5000)	29.160 (1.148)	24.765 (0.975)	26.988 (1 1/16-12)	22.225 (0.875)	3.302/3.683 (0.130/0.145)	34.925 (1.375)	23.825 (0.938)	46.355 (1.825)	27.94 (1.100)

R Max. Dia.	W	X Max. Dia.	Y Max. Dia.	Z Max. Dia.
12.7 (0.500)	30.835 (1.214)	22.225 (0.875)	12.7 (0.500)	34.29 (1.350)

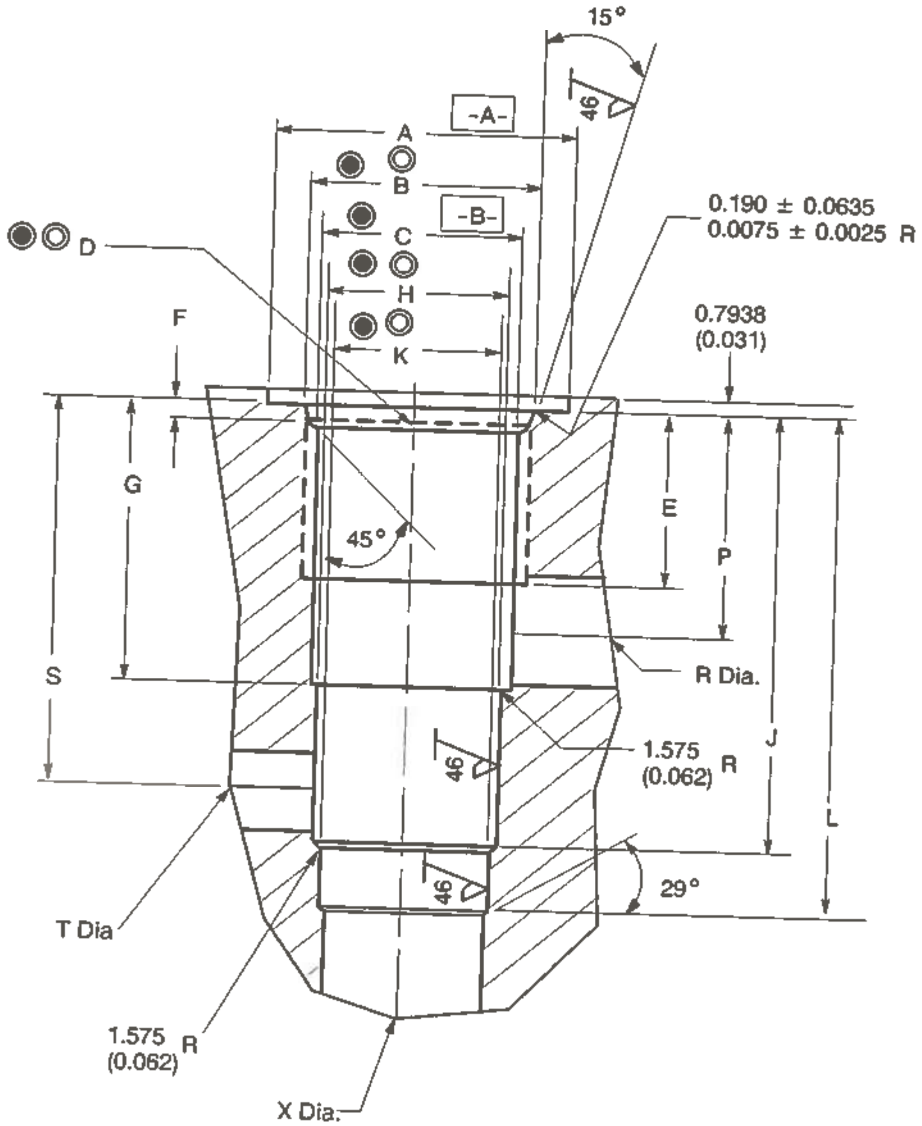
◉ These diameters ↗ .0508 mm (.002 inch) | B unless otherwise specified.

◎ These diameters ⊥ .0254 mm (.001 inch) | A unless otherwise specified.

Standard Cavity Dimensions

C-12-3, 3-Way Cavity

mm (inch)



Cavity

Cavity	A Spotface	B .002	C .002	D Thread thd. class 2B	E Full Thread	F	G	H ± .001	J	K ± .001
C-12-3	38.1 (1.5000)	29.160 (1.148)	24.765 (0.975)	26.988 (1 1/16-12)	22.225 (0.875)	3.302/3.683 (0.130/0.145)	34.925 (1.375)	23.825 (0.938)	57.785 (2.275)	22.25 (0.876)

L	P	R Max. Dia.	S	T Max. Dia.	X Max. Dia.
69.215 (2.725)	27.94 (1.100)	12.7 (0.500)	50.8 (2.000)	12.7 (0.500)	20.625 (0.812)

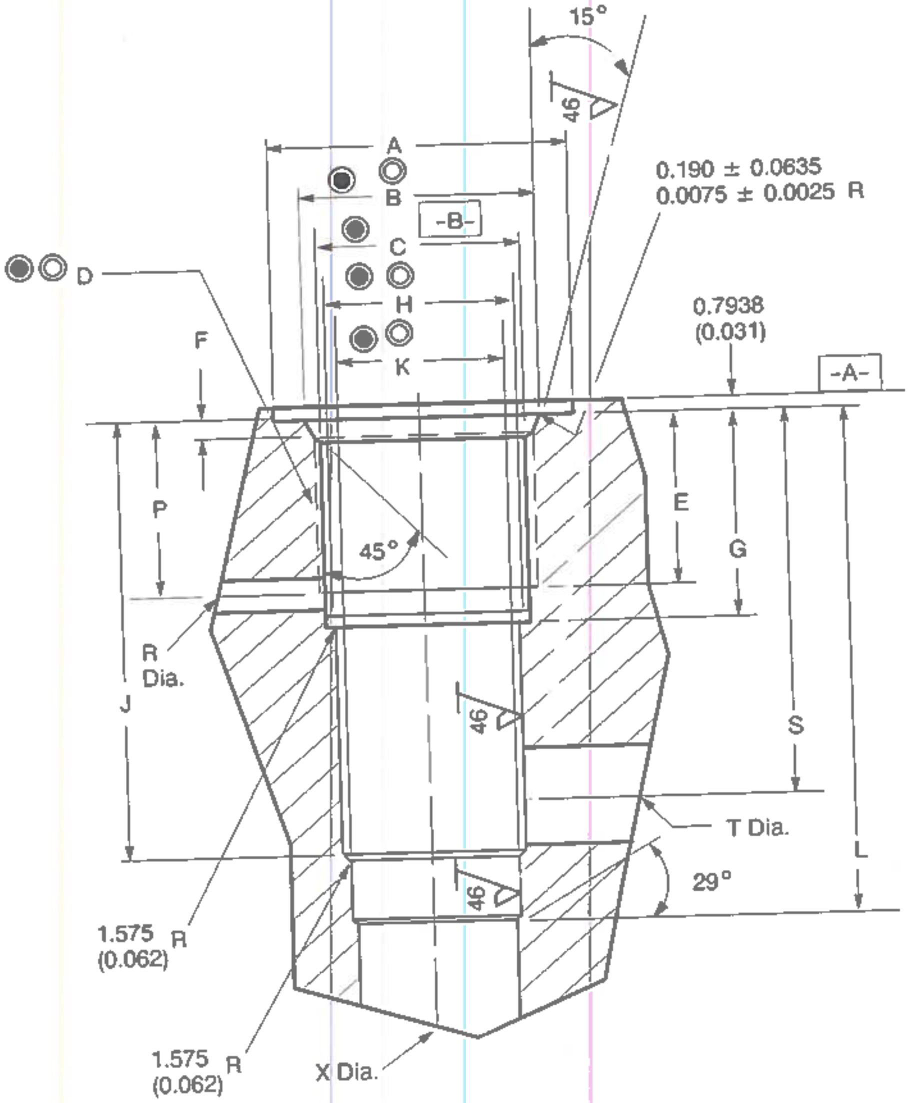
● These diameters ↗ .0508 mm (.002 inch) B unless otherwise specified.

◎ These diameters ⊥ .0254 mm (.001 inch) A unless otherwise specified.

Standard Cavity Dimensions

C-12-3S, 3-Way Short Cavity

mm (inch)



Cavity

Cavity	A Spotface	B .002	C .002	D Thread thd. class 2B	E Full Thread	F	G	H ± .001	J	K ± .001
C-12-3S	38.1 (1.5000)	29.160 (1.148)	24.765 (0.975)	26.988 (1 1/16- 12)	22.225 (0.875)	3.302/3.683 (0.130/0.145)	25.4 (1.000)	23.825 (0.938)	48.26 (1.900)	22.25 (0.876)

L	P	R Max. Dia.	S	T Max. Dia.	X Max. Dia.
59.69 (2.350)	22.23 (0.875)	4.826 (0.190)	41.275 (1.625)	12.7 (0.500)	20.625 (0.812)

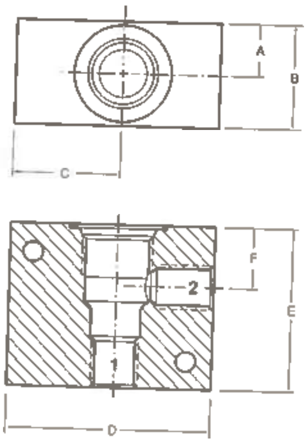
◉ These diameters ↗ .0508 mm (.002 inch) B unless otherwise specified.

◎ These diameters ⊥ .0254 mm (.001 inch) A unless otherwise specified.

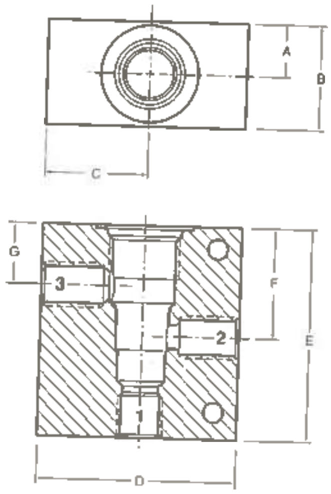
Fatigue Rated Housings – Series 12

NFPA pressure rated (10 million cycle fatigue rating to 207 bar (3000 psi) max.)

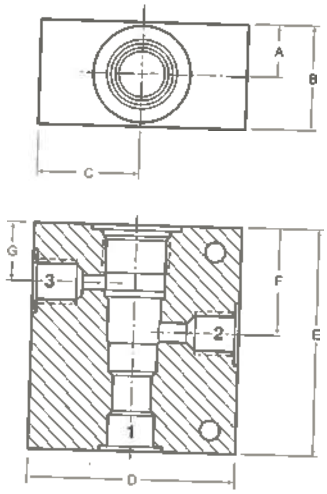
C–**–2



C–**–3



C–**–3S



mm (inch)

Cavity	A	B	C	D	E	F	G
C-12-2	25.4 (1.000)	50.8 (2.000)	44.45 (1.750)	88.9 (3.500)	88.9 (3.500)	28.73 (1.131)	—
C-12-3	25.4 (1.000)	50.8 (2.000)	44.45 (1.750)	88.9 (3.500)	107.95 (4.250)	51.58 (2.031)	28.73 (1.131)
C-12-3S	25.4 (1.000)	50.8 (2.000)	44.45 (1.750)	88.9 (3.500)	101.6 (4.00)	42.06 (1.656)	23.01 (.906)

Port 1	Port 2	Port 3 working	Port 3 pilot
G 1/2"	G 1/2"	G 1/2"	G 1/4"
G 3/4"	G 3/4"	G 3/4"	G 3/8"
SAE 10	SAE10	SAE 10	SAE 6
SAE 12	SAE12	SAE 12	SAE 6

Weights

Aluminum Housing

2-Way - .88 kg (1.96 lbs)
3-Way - 1.07 kg (2.38 lbs)
4-Way -1.01 kg (2.24 lbs)

Steel Housing *

2-Way -2.66 kg (5.88 lbs)
3-Way - 3.23 kg (7.14 lbs)
4-Way - 3.04kg (6.72lbs)

* For pressures over (210) bar (3000 psi), the steel housing is required

Size 12 Cartridge Valves

Supporting Products

Form Tools

Tooling for Machining Standard Cavities

Customers wishing to manufacture their own housings or manifolds can purchase Vickers cavity tools, designed to ensure exactly the right cavity dimensions and surface finishes. For in-depth advice on the machining of cavities, consult your Vickers sales engineer.

The range covers roughing tools that create the basic shape of the whole cavity, and separate finishing tools for the cylindrical bores, and the spotface plus O-ring recess. Cavity thread forms can be machined from standard tooling available from local tool suppliers.

The following table matches each 12 size cartridge valve with its appropriate cavity size and corresponding data sheet.

For cavity	12 Size Cartridge Valve	Refer to Data Sheet
C-12-2 or C-12-2U	CV11-12 FCV11-12 RV11-12	544 549 547
C-12-3	PRV12-12	545
C-12-3S	PSV11-12 VRV11-12 PRV11-12	546 548 550

Roughing tools

For cavity size	Part number	Description
C-12-2 C-12-2U*	RT-12-2-A-8213	Rougher, Aluminum
C-12-3	RT-12-3-A-8217	Rougher, Aluminum
C-12-3S	RT-12-3S-A-8220	Rougher, Aluminum

Finishing tools

Aluminum

For cavity size	Part number	Description
C-12-2 C-12-2U*	FT-12-2-A-8211 FT-12-2-A-8212 FT-12-2-AS-8214	Finisher for 1" collet Finisher for 3/4" collet Finisher for 3/4 " collet, high speed
C-12-3	FT-12-3-A-8215 FT-12-3-A-8216	Finisher for 1" collet Finisher for 3/4" collet
C-12-3S	FT-12-3S-A-8218 FT-12-3S-A-8219	Finisher for 1" collet Finisher for 3/4" collet

Steel

For cavity size	Part number	Description
C-12-2 C-12-2U*	FT-12-2-AS-8214	Finisher for 3/4" collet
C-12-3	FT-12-3-AS-8244 FT-12-3-AS-8245	Finisher for 1" collet Finisher for 3/4" collet
C-12-3S	FT-12-3S-AS-8242 FT-12-3S-AS-8243	Finisher for 1" collet Finisher for 3/4" collet

* *A separate operation is required to machine the C-12-2U cavity. Consult factory.*

Seal Kits

Cartridge seal kits, comprising external seals and back-up rings, are the only spare parts available.

For cavity size	Part number	Description
C-12-2 C-12-2U	SK2-12-2 SK2-12V-2	2-way valve Buna-N seal kit 2-way valve Viton seal kit
C-12-3 C-12-3S	SK2-12-3 SK2-12V-3	3-way valve Buna-N seal kit 3-way valve Viton seal kit

Hydraulics, electro-hydraulics, electronics: high performance products with quality standards second to none – for enhanced productivity and economy.

Vickers components and systems are used extensively for in-plant machinery, mobile vehicles, automotive equipment, aerospace and marine applications.

Presented by:

VICKERS

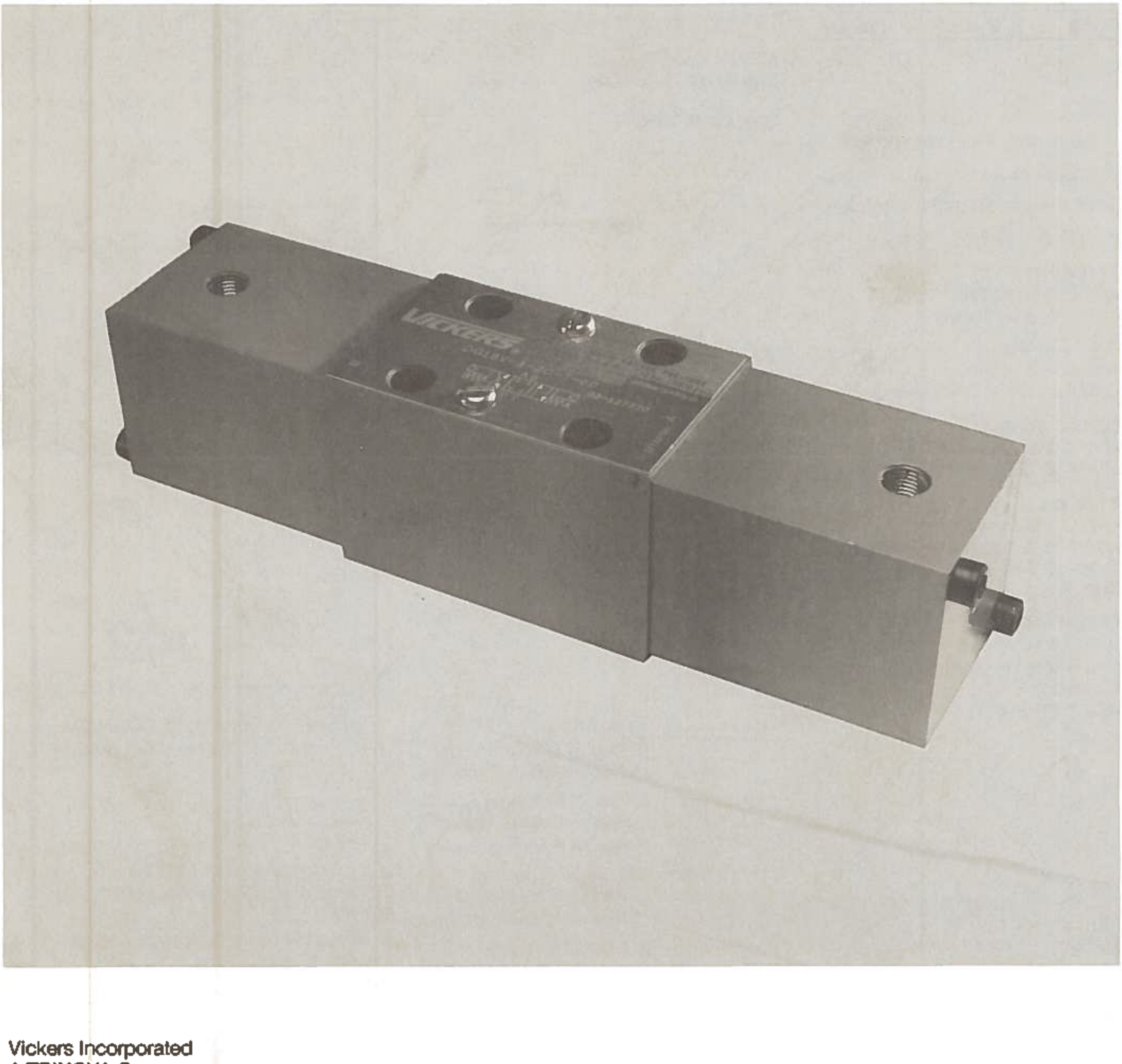
A TRINOVA Company

GB-C-2262-9.92-3.0-USA-HB

Service Data

Air Pilot Operated Directional Control Valve

DG18V-3-*A/B/F(L)-(P2)-(V)-*-60
DG18V-3-*C/N-(V)-*-60



Vickers Incorporated
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Troy, Michigan 48007-0302
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Released 09-01-91

Spool Type	Model	Spool
* O	A	617498
	B, C, F	617121
	N	890189
** 1, 11	B, C, F	458263
* 2	A	617120
	B, C, F	617118
	N	617126
**** 22	A	617122
*** 3, 31	B, C, F	617124
33	B, C, F	617123
* 6	A	890188
6	B, C, F	617119
	N	617341
**** 7	A	458151
7	B, C, F	617125
***** 8	B, C, F	458950

SPOOL ASSEMBLY NOTE:

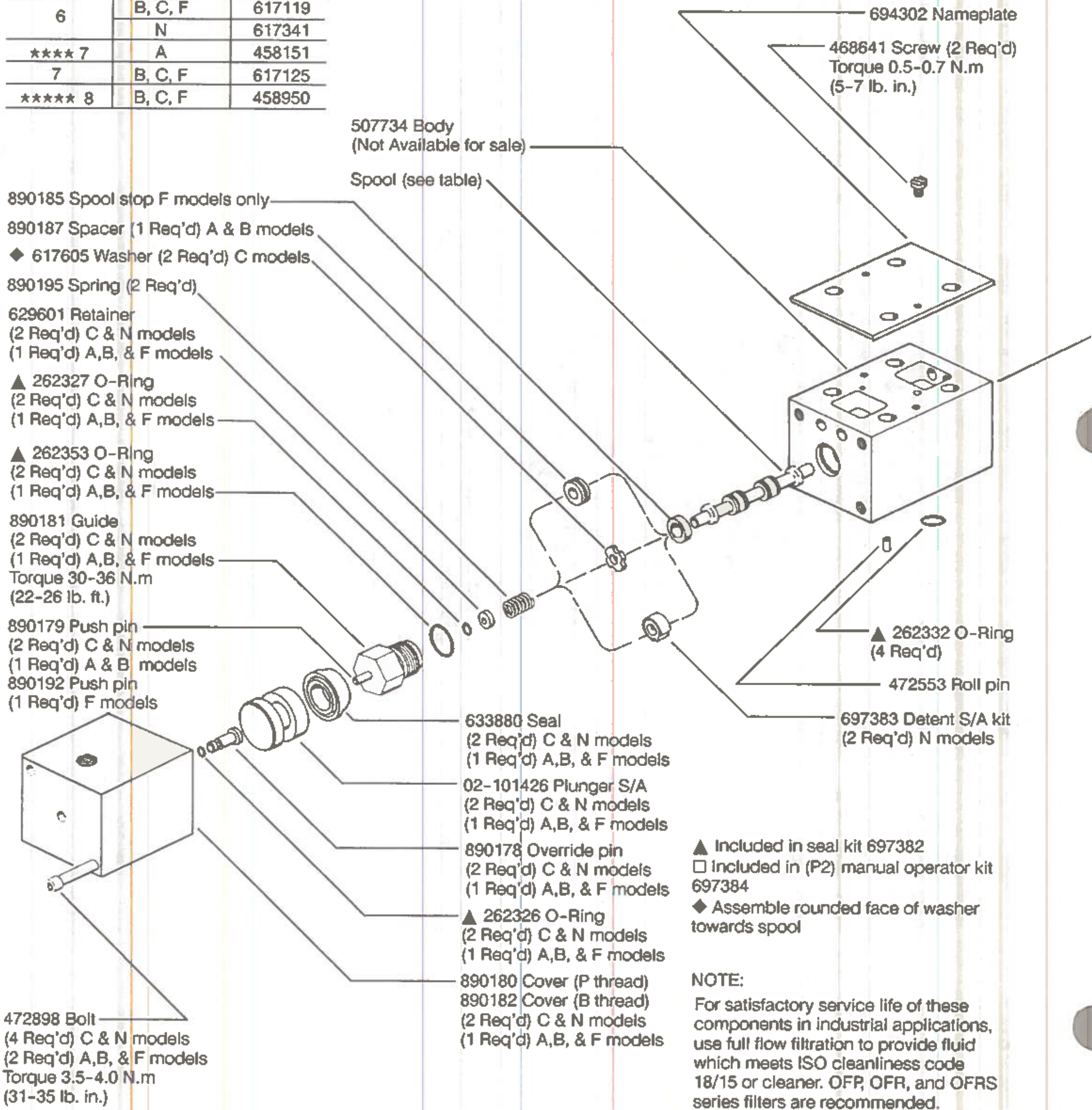
* Assemble type "OA", "2A", and "6A" spool in body with longer end land opposite of operator.

** Assemble type "1" spool in body with narrow center land towards "A" port. Assemble type "11" spool in body with narrow center land towards "B" port.

*** Assemble type "3" spool in body with narrow center land towards "A" port. Assemble type "31" spool in body with narrow center land towards "B" port.

**** Assemble type "7A" and "22A" spool in body with reduced longer end Dia. towards operator.

***** " V" Option, operator "A" is at port "A" end of valve and/or operator "B" is at port "B" end of valve, independent of spool type. Type 8 spool valves will always have a "V" present in model code.



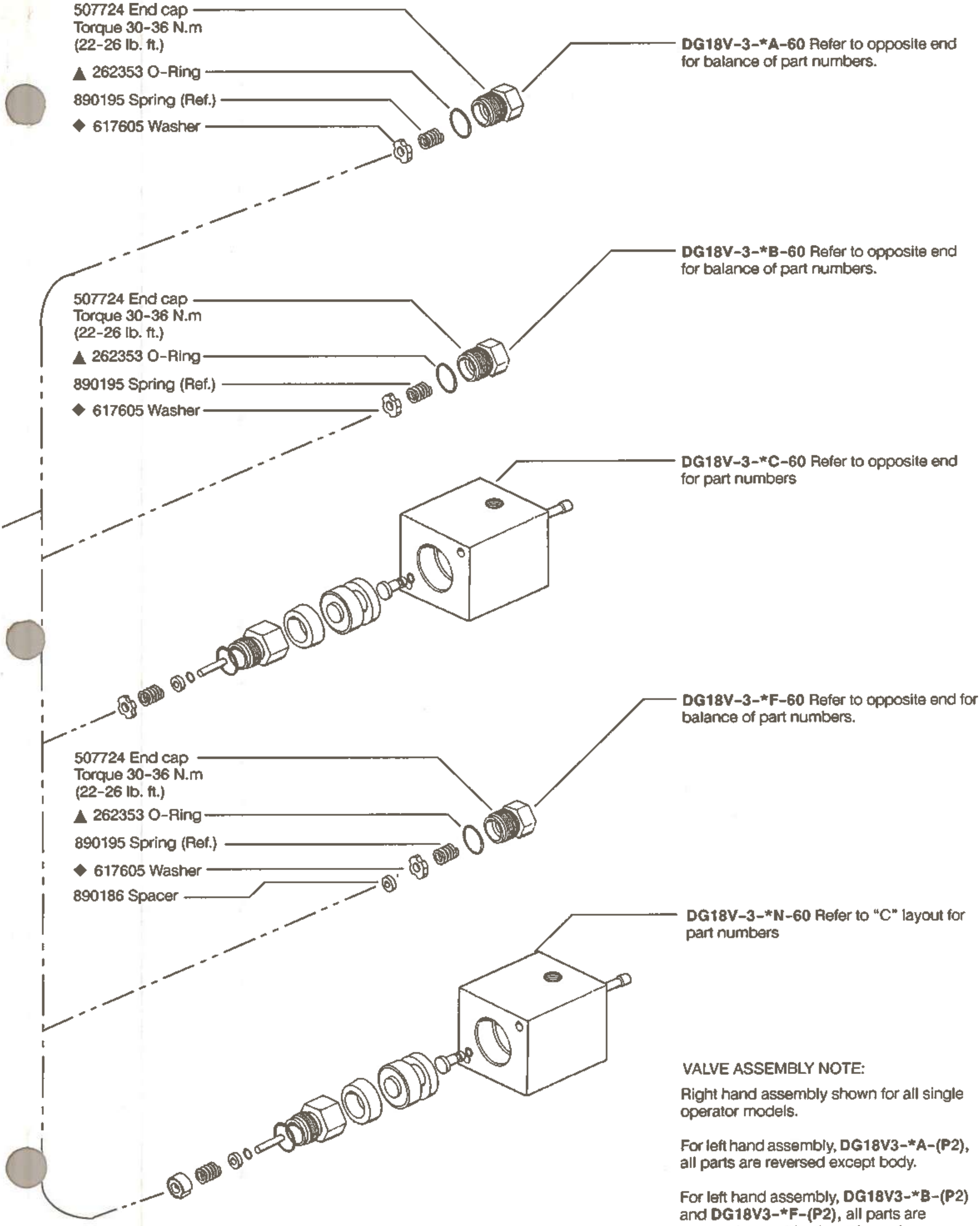
▲ Included in seal kit 697382

☐ Included in (P2) manual operator kit 697384

◆ Assemble rounded face of washer towards spool

NOTE:

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. OFP, OFR, and OFRS series filters are recommended.



VALVE ASSEMBLY NOTE:

Right hand assembly shown for all single operator models.

For left hand assembly, **DG18V3-*A-(P2)**, all parts are reversed except body.

For left hand assembly, **DG18V3-*B-(P2)** and **DG18V3-*F-(P2)**, all parts are reversed except body and spool.

Model Code

D G 18 V –3– * * (L) – (P2) – (V) –* – 60

1 2 3 4 5 6 7 8 9 10 11

1 Directional control valve, subplate mounted

2 Air pilot operated

3 Rated pressure

350 bar (5000 psi)

4 Interface

ISO 4401-03 (CETOP 3, NFPA D03)

5 Spool type (Center condition)

0 – Open center (All ports)
1 – Open center (P & A to T)
2 – Closed center (All ports)
3 – Closed center (P & B)
6 – Closed center (P only)
7 – Open center (T blocked)
8 – Tandem center (P to T)
11 – Open center (P & B to T)
22 – Closed center (Two-way)
31 – Closed center (P & A)
33 – Closed center (Bleed A & B)

6 Spool spring arrangement

A – Spring offset to CLY. A, (Single operator)
B – Spring centered, (Single operator)
C – Spring centered (Dual operator)
F – Spring offset, to CLY. A, shift to center (Single operator)
N – No-spring, detented

7 Build type

L – Left hand build (Single operator only)
Blank – Standard right hand build (Single operator only)

8 Manual override option

P2 – Manual operator in end cap, (single operators) (Applicable for A(L), B(L) & F(L) models only)
Blank – Overrides in operator end only

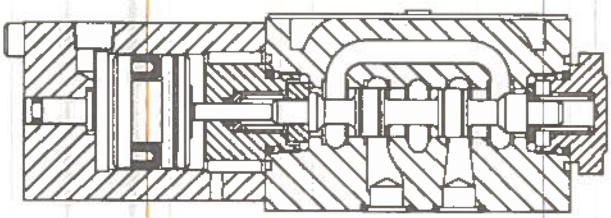
9 Actuator identity

V – Actuator identifier included for all type 8 spools (Refer to spool assembly note *****)

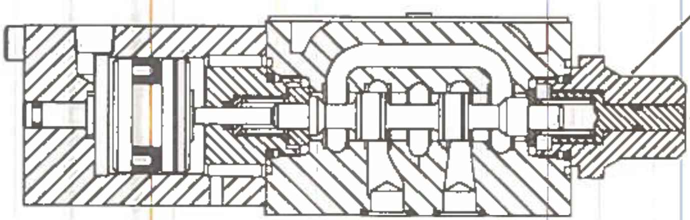
10 Thread connection type

P - 1/8" NPT threads
B - 1/8 BSP threads

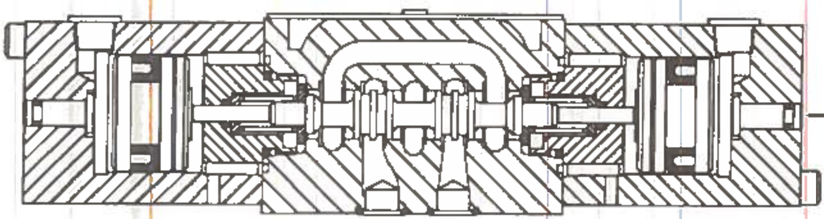
11 Design number



DG18V-3-*A-*-60 Typical spring offset valve / single operator



DG18V-3--P2-*-60** With manual operator in end cap / single operator

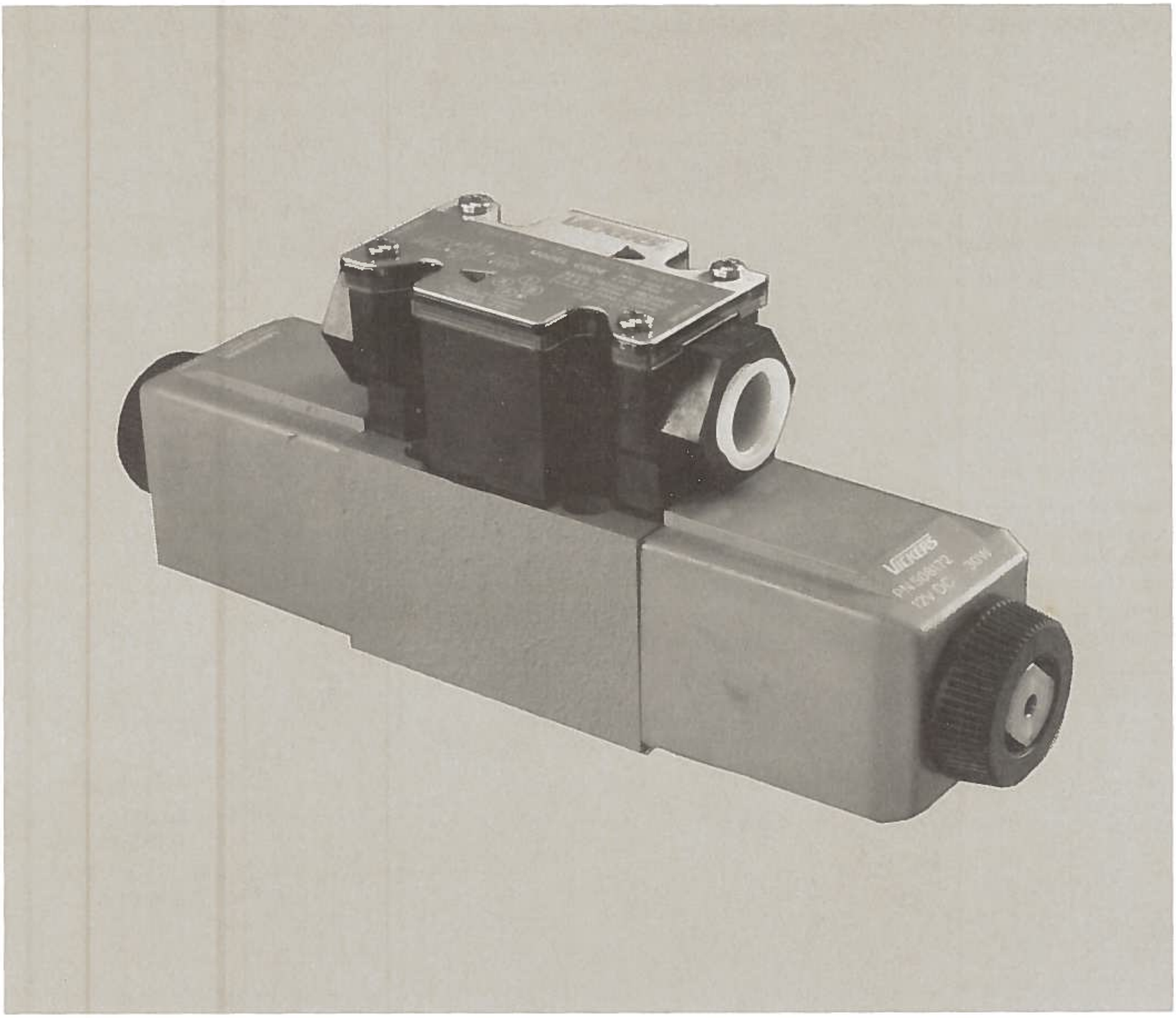


DG18V-3-*C-*-60 Typical spring centered valve / dual operator

Service Data

Cetop 3 Size Proportional Directional Control Valves

KD/TG4V-3S-*B/C/F(L)-**-*-(V)M-***(I)-*5-60-(EN**)



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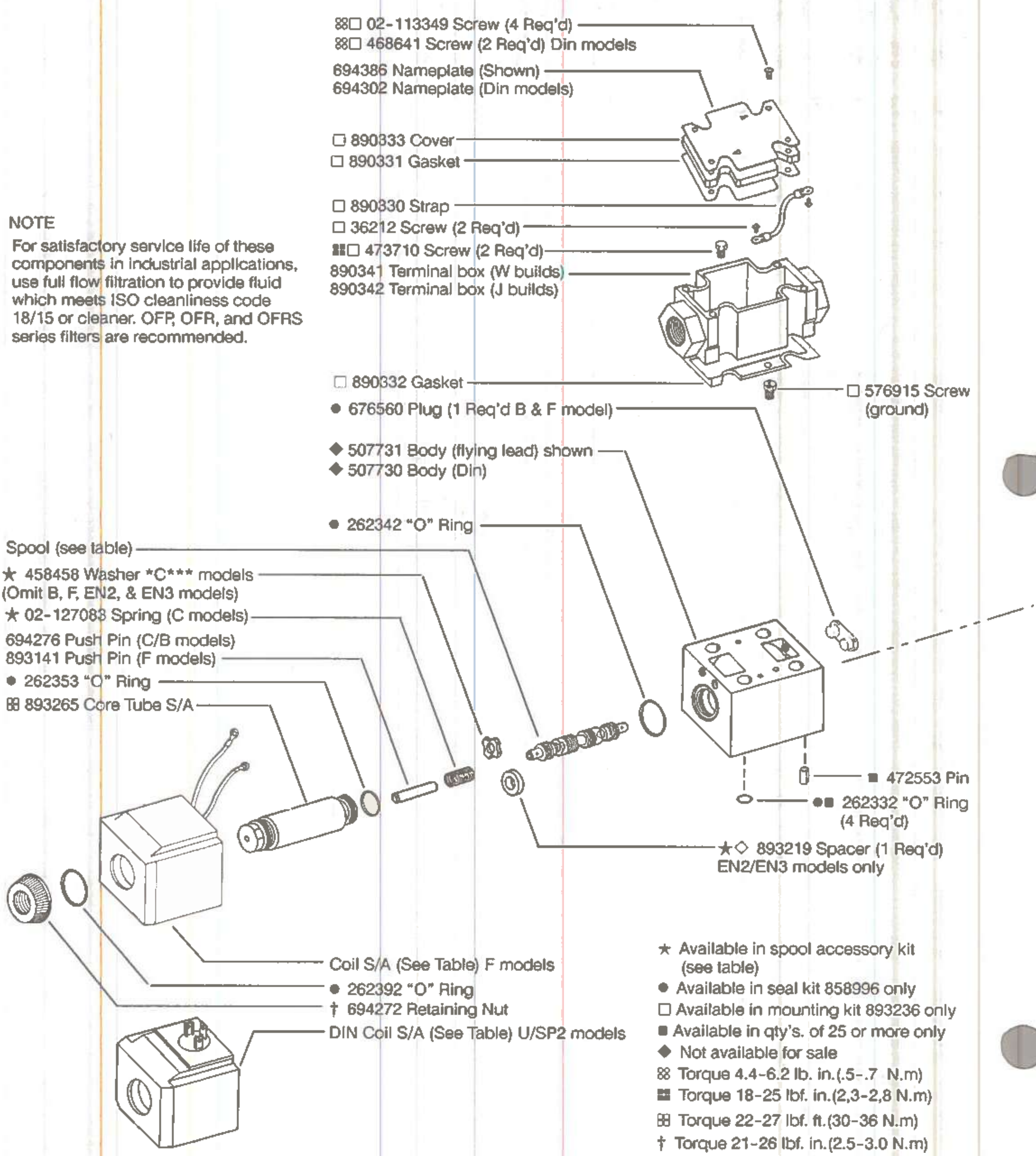
Released 09-01-91

I-3897-S

COIL-LETTER	COIL S/A F MODELS	COIL S/A U MODELS	COIL S/A SP2 MODELS
G	02-134567	02-134569	————
GP	508172	507847	02-111166
H	02-134568	02-134570	————
HA	508173	507848	02-111168

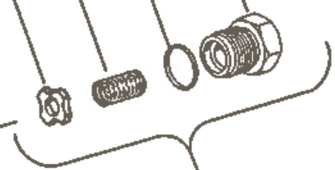


NOTE

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. OFP, OFR, and OFRS series filters are recommended.

- ★ Available in spool accessory kit (see table)
- ● Available in seal kit 858996 only
- ☐ Available in mounting kit 893236 only
- ■ Available in qty's. of 25 or more only
- ◆ Not available for sale
- ⌘ Torque 4.4-6.2 lb. in.(.5-.7 N.m)
- ▪▪ Torque 18-25 lbf. in.(2,3-2,8 N.m)
- ⊞ Torque 22-27 lbf. ft.(30-36 N.m)
- † Torque 21-26 lbf. in.(2.5-3.0 N.m)

NOTE
See service drawing I-3886-S for options not shown.

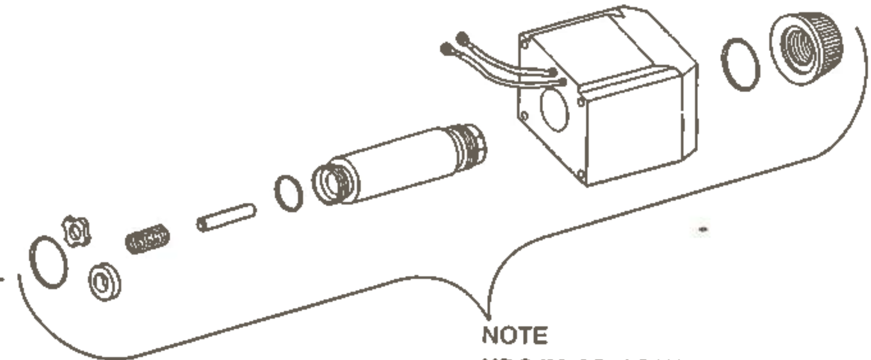


⊞ 507908 End cap
● 262353 "O" Ring
★ 02-134574 Spring (1 Req'd)
★ 458458 Washer

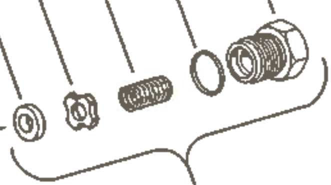
NOTE
KTG4V-3S-*B(L)-(V)M-FW-60**
Spring Centered, Sol. "A" Removed
Refer to other end of valve for common part numbers except as noted.

SPOOL NOTES
☆ Assemble type 2C15S-EN4 spool with long land over "A" port.
◇ Assemble spacer 893219 on "A" port end for 3C15N-EN2 spool and on "B" port end for 131C15N-EN3 spool.
Assemble spool with notched land over "A" port for both EN2 and EN3 models.
♠ Assemble spool with long land over "B" port.
⁘ Assemble spool with long land over "A" port.

NOTE
Right hand assembly shown for all single solenoid valves, for left hand assembly all parts are reversed except body.



NOTE
KDG4V-3S-*C*N-(V)M-FW-60-(EN2/3)
KDG4V-3S-*C-(V)M-FW-60-(EN4)**
Spring Centered, Dual Solenoid
Refer to other end of valve for common part numbers except as noted.



⊞ 507908 End cap
● 262353 "O" Ring
★ 02-134574 Spring (1 Req'd)
★ 458458 Washer
★ 893142 Spacer

NOTE
KTG4V-3S-*F(L)-(V)M-FW-60**
Spring offset to CYL. "A", shift to center
Refer to other end of valve for common part numbers except as noted.

MODEL	SPOOL	TYPE	SPOOL ACCESSORY KIT
-*C***	893131	2C19S	697373
	893132	2C19N	
	893127	2C08S	
	893128	2C08N	
	893129	2C15S	
	893130	2C15N	
	893138	33C08A	
	893139	33C15A	
	893220	33C22A	
	893134	☆ 2C15S-EN4	
	893133	◇ 3C15N-EN2	697376
	893133	◇ 131C15N-EN3	
-*B**N	893137	♠ 2*19N	697374
	893136	♠ 2*08N	
	893221	♠ 2*15N	
-*F**N	893137	⁘ 2*19N	697375
	893136	⁘ 2*08N	
	893221	⁘ 2*15N	

Model Code

K*G4V-3 S -* * (L) - * * - * (V) M - * * * (I) -* 5 - 60 - (EN**)

1 | 2 3 | 4 5 | 6 | 7 8 | 9 | 10 | 11 | 12 13 14 15 | 16 17 | 18 | 19

1 **K - Proportional**
D - Directional control valve
T - Throttle valve
G - Subplate mounted
4 - Solenoid operated
V - 350 Bar (5075 psi) P, A, & B ports

2 Interface
3 - ISO-4401-03 CETOP 3 (NFPA D03)

3 Standard performance
S - Standard performance

4 Spool type (see table)

5 Spool/Spring arrangement
B - Spring centered, sol. A removed
C - Spring centered, dual solenoid
F - Spring offset to cyl. A, shift to center

6 Build type
L - Left hand build single solenoid models only
Blank - Standard right hand build

7 Spool flow rating
(@ 10 bar (145 psi) pressure drop
08 - 8 L/min. (2 USgpm)
15 - 15 L/min. (4 USgpm)
19 - 19 L/min. (5 USgpm)

8 Metering condition
S - Meter-out (only)
A - Meter-in (only)
N - Meter-in and Meter-out

9 Manual override options
Blank - Plain override solenoid ends only
H - Waterproof override solenoid end only
P2 - Plain override both ends of single solenoid models

10 Solenoid Identification
(models with EN2, EN3 or EN4 require V in model code for reverse solenoid identification)

11 Flag
Electrical options & features (refer to service drawing I-3886-S)

12 Coil type
F - Flying lead
U - DIN 43650
SP1 - Single 6.3 mm series spade to IEC 760 (Direct D.C. models only)
SP2 - Dual 6.3 mm series spade to IEC 760 (Direct D.C. models only)

13 Electrical connections (F type coil only) omit if not required
T - Wired terminal block
PA - Instaplug male receptacle only
PB - Instaplug male & female receptacle
PA3 - Three pin connector
PA5 - Five pin connector

14 Housing (F type coils only)
W - 1/2 NPT thread wiring housing
J - 20 mm thread wiring housing

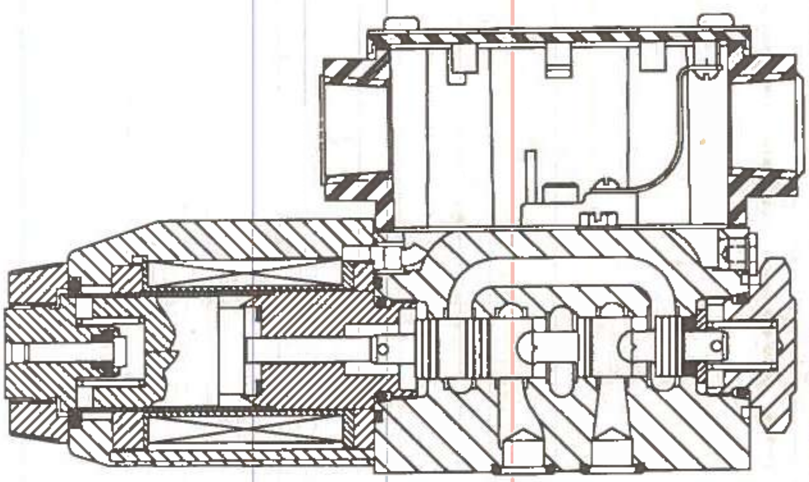
15 Electrical Options
(omit when not required)
I - ISO 4400 with fitted plug (U models only)

16 Coil indentification letter
(see table)

17 Tank pressure rating
5 - 100 Bar (1450 psi)

18 Design

19 Special modifications
(omit if not required)

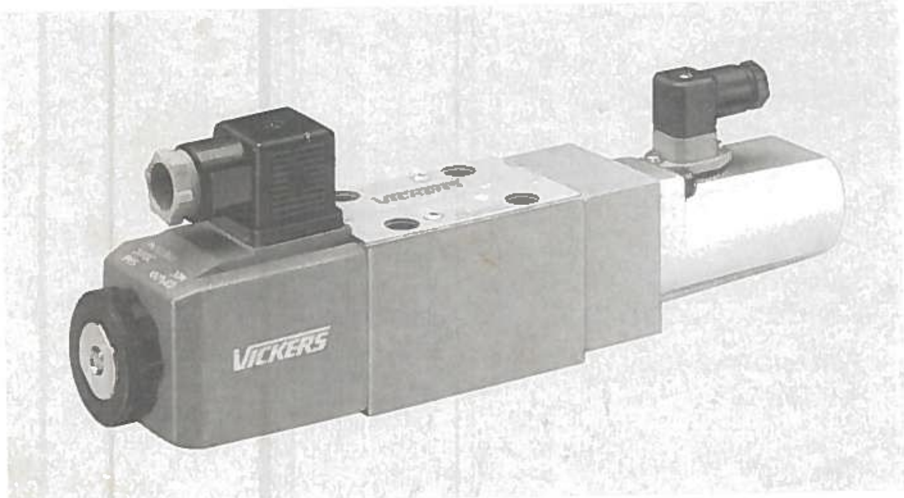


Typical sectional view, KTG4V-3S-*F(L)**-(V)M-FW-*5-60 spring offset valve.

VICKERS

Directional Valve with Spool Position Indicator Switch

DG4V-3 - - - S6, 60 Series

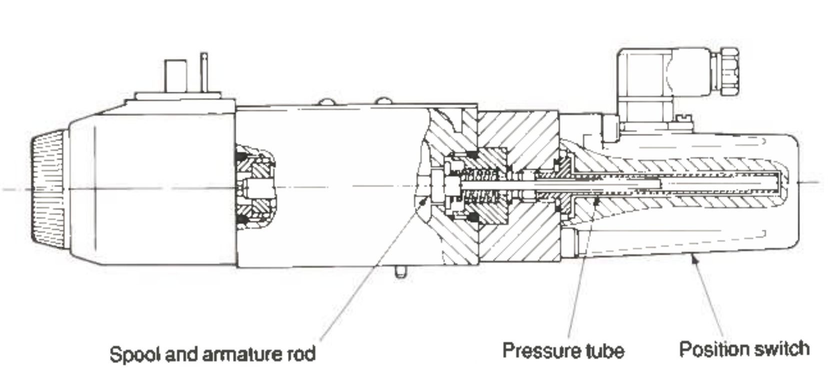


1. General Description

A single-solenoid-operated directional valve with an integral electrical switch that indicates when the valve spool is in the spring-returned position. This model is ideally suited for use in systems where electrical indication of a known condition of the valve is required for interlocks, system sequencing, etc.

The basic valve is a Vickers DG4V-3, 60 series, featured in catalog C-2015A.

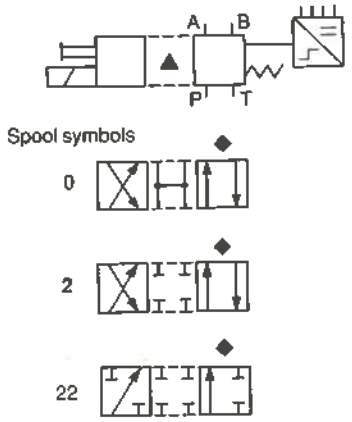
Sectional Illustration



2. Functional Symbols

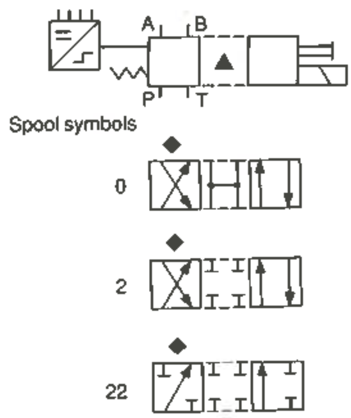
Single solenoid valves, solenoid at port A end

DG4V-3-*A valves



Single solenoid valves, solenoid at port B end

DG4V-3-*AL valves



▲ *Transient condition only*
◆ *Spring offset, valve flow path(s) at switching point*

Note: spool type shown in bold is featured in the "Preferred Model Selection" below.

3. Model Code

The model code structure is as shown in catalog C-2015A, to which item numbers refer.

DG4V-3 - ** **-A(L)-(**)-(V)M-S6-U - * * -60-(EN***)-(P**-A**-B**-T**)**

[1] [2] [3] [4] [5] [6] [7] [9] [10] [11] [12] [13]

Features/options listed here are those available with the "-S6-" model. Features shown in bold are found in the "Preferred Model Selection" below.

[1] **Performance specification**
3 only

[2] **Spool type**
0 or **2** or 22 only

[3] **Spool spring arrangement**
L = LH build
Omit for RH build

[4] **Manual override option**
No symbol: standard manual override only

[5] **Solenoid energization identity**
See catalog C-2015A

[6] **Spool indicator switch S6**
See this catalog (for AC switch models, types S3, S4 and S5, see catalog C-2015A)

[7] **Solenoid type/connection**
U only (ISO 4400)

[9] **Coil rating**
Full power coils:
A = 110V AC 50 Hz
B = 110V AC 50 Hz/115V AC 60 Hz ▲
C = 220V AC 50 Hz/240V AC 60 Hz ▲
G = 12V DC
H = 24V DC

▲ *For use with 60 Hz or dual frequency applications*

[10] **Port T rating**
For AC coils:
6 = 160 bar (2300 psi)
For DC coils:
7 = 210 bar (3045 psi)

[11] **Design number, 60 series**
See catalog C-2015A

[12] **Special features**
See catalog C-2015A

[13] **Port restrictor plugs**
See catalog C-2015A

Preferred Model Selection

The models listed here are in regular volume production and are therefore most readily available at competitive prices. Other models constructed from the model code may be made available subject to the quantity requested. Please check availability and price before ordering.

DG4V-3-2A-M-S6-U-B6-60
DG4V-3-2A-M-S6-U-H7-60

4. Operating Data

For characteristics not listed here, refer to "Operating Data" in section 4 of catalog C-2015A under heading "High performance valve DG4V-3".

Pressure limits: P, A and B ports T port: AC solenoid models DC solenoid models	 350 bar (5075 psi) 160 bar (2300 psi) 210 bar (3045 psi)
Mounting interface	ISO 4400, size 03 ANSI/B93.7M, size D03 NFPA-D03 CETOP RP65H, size 3 DIN 24340, NG6

Continued on next page

Input:	
Supply voltage	10 to 35V DC inclusive of a max. 4V pk-to-pk ripple
Current, switch open	5 mA
Current, switch closed	255 mA
Outputs:	
Max. continuous current	250 mA
Voltage	2V below input at max. load
Load impedance	From 32Ω at 10V supply to 132Ω at 35V supply
Max. switching frequency	10 Hz
Plug connections:	
Pin 1 (output 1)	Normally open
Pin 2	Supply +ve
Pin 3	0V
Pin 4 (output 2)	Normally closed
Switching point	Within the spool spring off-set condition◆
Connector	Pg7 (supplied with valve)
Protection:	Overload and short-circuit protected; self re-setting. IEC 144 class IP65 with connector correctly fitted.

◆ *Factory setting ensures this condition under all combinations of manufacturing tolerance and of temperature drift (see "Temperature Limits").*

Temperature Limits

Minimum ambient .... –20°C (–4°F)

Maximum ambient
Valves with coils listed in model code position [9] and at stated percentages of rated voltage.

Coil type and frequency	Percentage voltage	Max. ambient temperature
Dual frequency coils		
at 50 Hz	107%	40°C (104°F)
at 50 HZ	110%	30°C (86°F)
at 60 Hz	107%	50°C (122°F)
at 60 Hz	110%	40°C (104°F)
Single frequency (50 Hz) coils		
at 50 Hz	110%	40°C (104°F)
DC coils	110%	70°C (158°F)

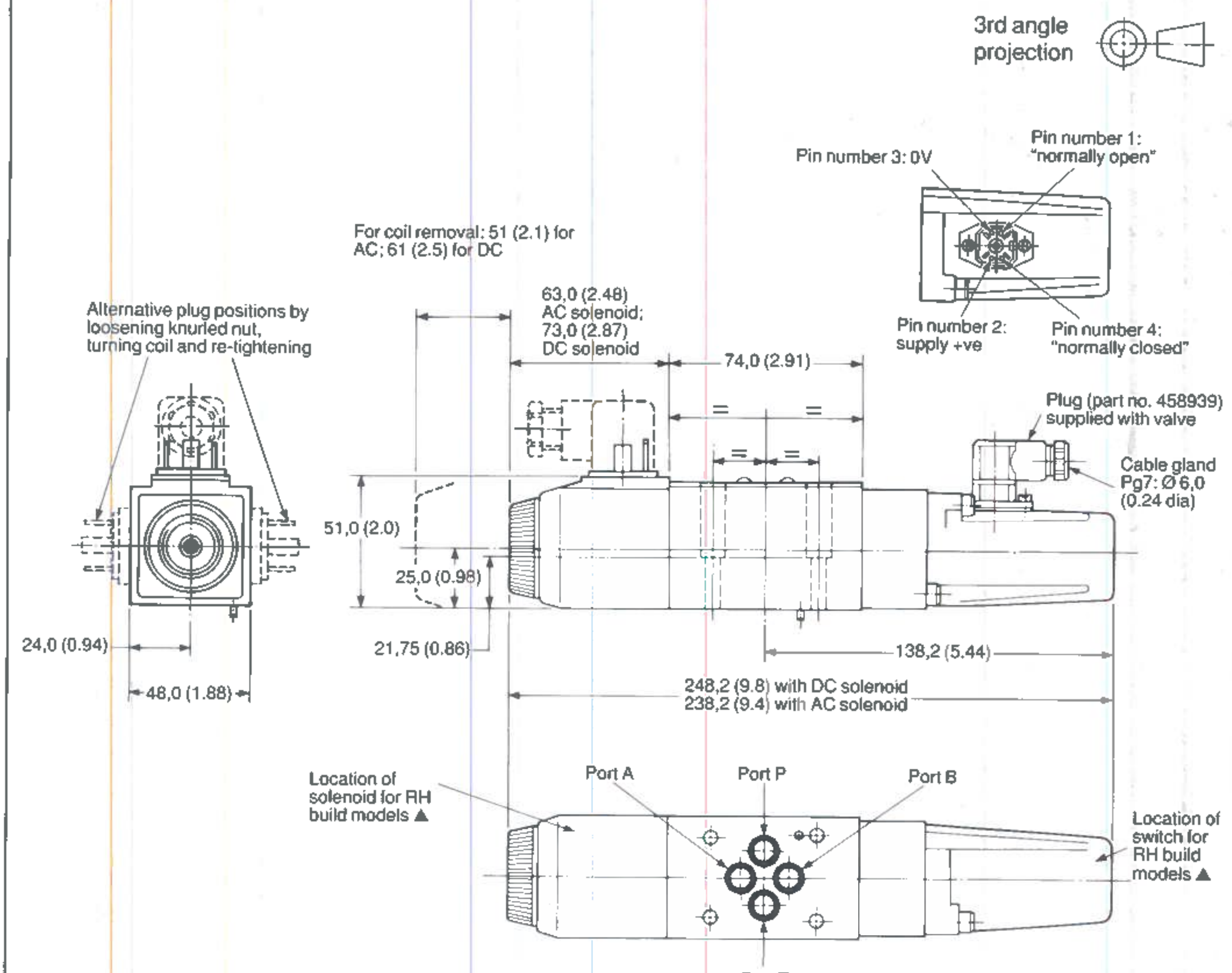
Further Information

For details of filtration, hydraulic fluids and fluid temperatures, see section 4 of catalog C-2015A.

5. Performance Data

See section 5 of catalog C-2015A under heading "DG4V-3 (High Performance) Models".

6. Installation Dimensions in mm (inches)



Solenoid identities for "S6" models

Model (Refer to [3] & [5] in model code)	Spool types	Solenoid identity
DG4V-3-**A-M-S6-U**-6*	0, 2 or 22	B
DG4V-3-**A-VM-S6-U**-6*	0, 2 or 22	A
DG4V-3-**AL-M-S6-U**-6*	0, 2 or 22	A
DG4V-3-**AL-VM-S6-U**-6*	0, 2 or 22	B

▲ *For LH models ("L" in model code location [3]) solenoid and switch locations are reversed*

7. Mass

2,2 kg (4.8 lb)

8. Electrical Plugs and Connectors

See "Plugs for ISO 4400 (DIN 43650) type coil connectors", section 8 of catalog C-2015A.

9. Installation Data

See section 9 of catalog C-2015A.

10. Spare Parts Data

See section 10 of catalog C-2015A.

Presented by:

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VICKERS

Proportional Slip-in Type Cartridge Throttles to DIN 24342

CVU-**-EFP1-31 design and Electronic Amplifier EEA-PAM-571-A-12 design

1. Basic Characteristics

Valves

Nominal sizes.......NG16; NG25; NG40
Max. operating pressure ....315 bar (4567 psi)
Flow ratings up to ....900 l/min (238 USgpm)
Hysteresis....................................<1%
Repeatability..............................±0.5%

Amplifier

Power input 20-30V DC
(24V DC nominal)

2. General Description

Proportional throttle (restrictor) valves for use where one or more of the following requirements exist.

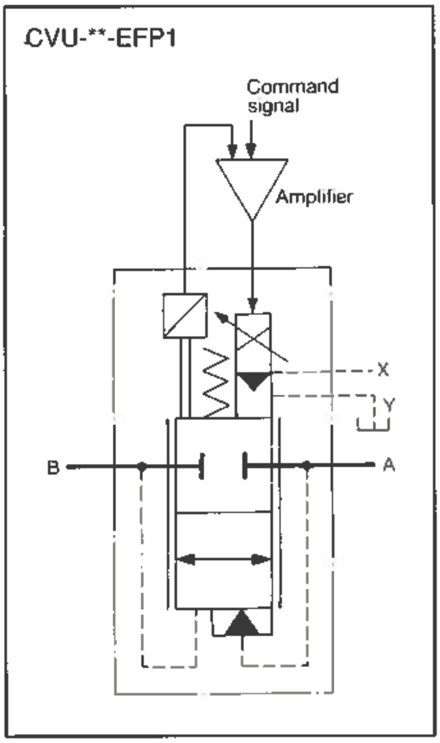
- Remote control of machine actuator speed, linear or rotary.
- Speed control in accordance with machine operating cycles or programs.
- Meter-in, meter-out or bleed-off application of the throttle valve itself.
- Pressure compensated flow control with the aid of a pressure hydrostat module, in any of the same three application modes.
- Smooth control of machine acceleration and/or deceleration.
- For industrial and mobile applications.

Note: Correct performance of valves can only be obtained using Vickers amplifier EEA-PAM-571-A-12.

3. Features and Benefits

- New 2-stage NG16 size with increased flow rating.
- Valves suitable for uni-directional and bi-directional control of flow.
- 3 valve sizes offer choice of flow capacities
  NG16: 190 l/min (50 USgpm)
  NG25: 450 l/min (119 USgpm)
  NG40: 900 l/min (238 USgpm)
  at 10 bar (145 psi) Δp.
- Designed for zero leakage when closed.
- Common amplifier for any valve size minimises inventory.
- 24V DC nominal supply to amplifier to suit state-of-art control systems.
- Choice of command signals.
- Acceleration and deceleration requirements can be adjusted on-site by "ramp" potentiometer.
- Facility for on-site adjustment of "dead band" compensation and "gain".
- Setting-up and fault diagnosis eased by panel display and signal monitoring points.

4. Functional Symbol



5. Model Codes (Valves)

F3-CVU-EFP1-B29-**-31**

1 2 3 4

1 Special seals for phosphate ester fluids
Omit for standard seals; see "Hydraulic fluids" section.

2 Nominal size (NG)
Flow path diameter mm
16
25
40

3 Rated flow at 10 bar (145 psi) Δp
19 = 190 l/min (50 USgpm), size 16 only
45 = 450 l/min (119 USgpm), size 25 only
90 = 900 l/min (238 USgpm), size 45 only

4 Design number
Subject to change: Installation dimensions unaltered for design numbers 31 to 39 inclusive.

6. Operating and Performance Data (Valves)

Performance data is typical with fluid at 25 cSt (119 SUS) and 50°C (122°F)

Pressure ratings: Ports A, B, X Port Y Cracking pressure: For flow A to B For flow B to A (see diagram 1.4 for valve area ratios)	 315 bar (4567 psi) max. ≤2 bar (29 psi) 2,5 bar (36 psi) 6,5 bar (94 psi)		
Flow ratings A to B/B to A	See 5. Model codes [3]		
Spool overlap, dead-band, typical CVU-16 CVU-25 CVU-40	 30% of full stroke 23% of full stroke 20% of full stroke		
Peak solenoid current at 50°C (122°F) ambient Nominal Max.	 2.2A (13.6W) 2.9A (18W)		
Solenoid coil resistance at 20°C (68°F)	2.8Ω		
Relative duty factor	Continuous rating (ED = 100%)		
Electrical protection with plugs fitted	IEC 144 class IP 65		
Dynamic performance‡	CVU-16	CVU-25	CVU-40
• Step input response at Δp 50 bar (725 psi): valve stroke between zero overlap and fully open. Opening time Closing time	 40 ms 50 ms	 60 ms 60 ms	 125 ms 125 ms
• Frequency response ▲, zero flow; 100 bar (1450 psi) at ports A, B, X. –3dB amplitude ratio 90° phase lag	 26 Hz 23 Hz	 18 Hz 17 Hz	 18 Hz 17 Hz
• Hysteresis	<1%	<1%	<1%
• Repeatability	±0.5%	±0.5%	±0.5%
Mass	3,3 kg (7.3 lbs)	4,1 kg (9.0 lbs)	8,0 kg (17.7 lbs)

‡ using amplifier EEA-PAM-571-A-12
▲ sinusoidal input ±5% at 50% full stroke command signal

Hydraulic Fluids
All cartridge valves can be used with anti-wear hydraulic oils, and certain low viscosity fluids. Add prefix "F3" to model designations when phosphate ester (not alkyl-based) or chlorinated hydrocarbons are to be used. The extreme viscosity range is from 500 to 5 cSt but the recommended running range is from 54 to 13 cSt. For further information about fluids, see "Technical information" leaflet B-920.

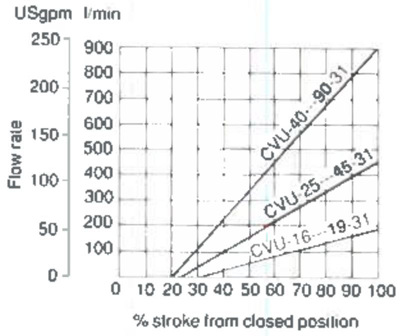
Temperature limits
Ambient min. ....–20°C
Ambient max. ....+70°C

Fluid temperatures

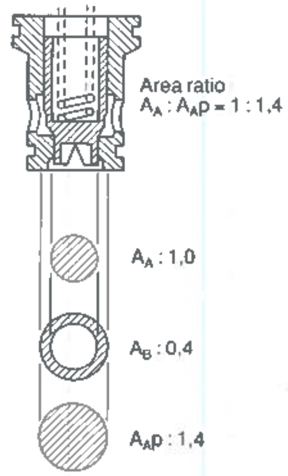
	Mineral oil	Water-containing
Min.	–20°C	+10°C
Max.	+80°C	+54°C

Filtration requirements
ISO 4406: 1986 class 16/13 or better.

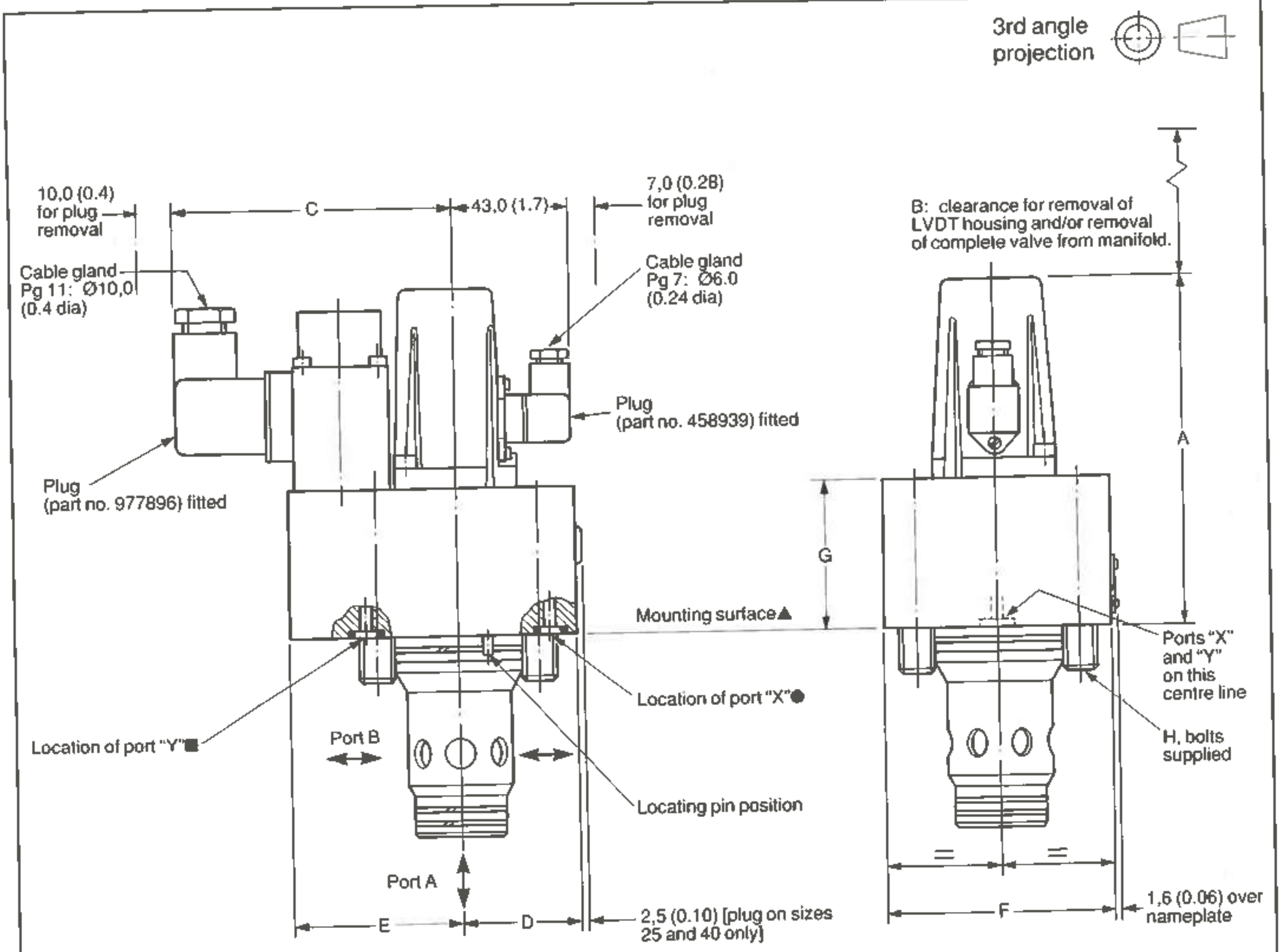
Flow/stroke characteristics



Valve area ratios



7. Installation Dimensions for Valves in mm (inches)

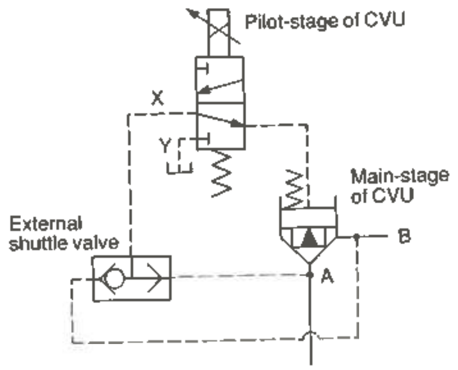


Dimension	CVU-16	CVU-25	CVU-40
A	130,00 (5.12)	128,00 (5.04)	133,00 (5.24)
B	68,50 (2.70)	71,50 (2.82)	104,00 (4.10)
C	109,50 (4.31)	105,50 (4.15)	105,50 (4.15)
D	32,50 (1.28)	42,50 (1.67)	63,00 (2.48)
E	70,00 (2.76)	65,50 (2.58)	63,00 (2.48)
F	66,60 (2.62)	85,00 (3.45)	126,00 (4.96)
G	57,00 (2.24)	55,00 (2.16)	60,00 (2.36)
H	4 x M8 x 35	4 x M12 x 45	4 x M20 x 70

Connections to port X

For **unidirectional** control of flow (ie A to B **or** B to A) port X must be connected to upstream port pressure.

For **bidirectional** control of flow (ie flow A to B **and** B to A at different times during an operating cycle) port X must be connected to **both** A and B via a shuttle valve (see diagram).

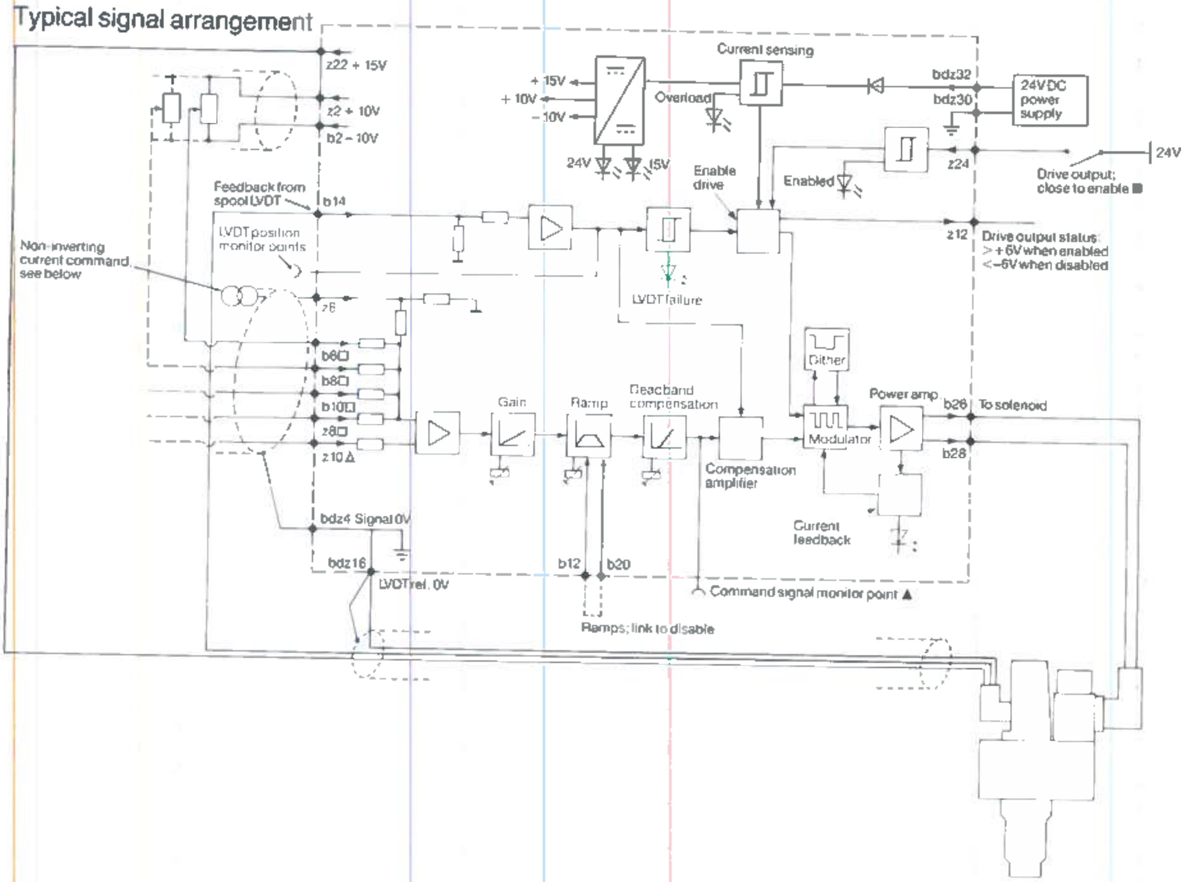


▲ Installation dimensions below mounting surface, including location of ports "X" and "Y" and size/length of bolts "H", conform to requirements of DIN 24342 (see Vickers data sheet B-995).
■ Connect to drain: pressure must not exceed 2 bar (29 psi).

8. Power Amplifier Circuit and Connections

EEA-PAM-571-A-12 design

Typical signal arrangement



Command signals and outputs

Command signals

Type	Input pins Ref.	Signal polarity	Secondary pins ref.
Non-inverting voltages	b6/8/10 or z8	+	bdz4
Non-inverting current	z6	+	
Inverting voltage	z10	–	Link one of b6/8/10 or z8 to bdz4
Differential voltage	z10	–	One of b6/8/10 or z8
	One of b6/8/10 or z8	+	z10

LVDT connections

LVDT plug pin	Amplifier pin
1	b14
2	z22
3	bdz16
4	–

▲ On front panel
■ 10 to 30V to enable, ≤0.8V or open circuit to disable
□ Non-inverting voltage commands
△ Inverting or differential voltage command

9. Operating Data (Amplifier)

Power (input) supply	20 to 30V DC x 40W max. 24V DC nominal 2V pk-to-pk max. ripple
Control (output) supplies: z22 z2 b2	+15V x 50 mA max. in addition to LVDT demand +10V x 5 mA max. –10V x 5 mA max.
Command signal inputs: Direct voltage pins Inverting voltage pin Current pin Voltage range Input impedance (voltage) Current range Input impedance (current)	 b8, b6, z8, b10 z10 z6 10V 47 kΩ 20 mA 100Ω
Standing solenoid current at zero command signal	1,1A
Deadband compensation: Factory-setting Adjustment	 10% of max. stroke▲ 0 to 50% of max. stroke▲
Gain control: Factory-setting Adjustment per direction from centered position	 Max. spool stroke at 10V command signal▲ 1,9 to 20% of max. spool stroke per V▲
Ramp time adjustment, linear: Factory-setting Adjustment	 Max. time 50 ms to 2s, under pre-set deadband compensation and gain conditions
Dither	Factory-set
Feedback from LVDT to b14	12 to 20 mA (100Ω)
Overload protection, factory-set	Automatic reset when fault removed
Output enabled (power available to solenoid)	Apply 10 to 30V to z24 (6,8 kΩ)
Output disabled (no power output to solenoid)	Apply ≤0,8V or open circuit to z24
Ramp enabled (machine actuator acceleration and deceleration limited by ramp potentiometer)	Open circuit between b20 and b12
Ramp disabled (fastest acceleration and deceleration of machine actuator; ramp circuit bypassed)	Link b20 to b12
Command signal monitor point	5V full scale. Command signal conditioned by deadband compensation, gain and ramp functions
Spool position monitor point	5V full scale
Monitor point impedance	10 kΩ
Monitor point protection	Short-circuit protected
Output point (z12) to alarm indicator	>+6V when enabled <–6V when disabled

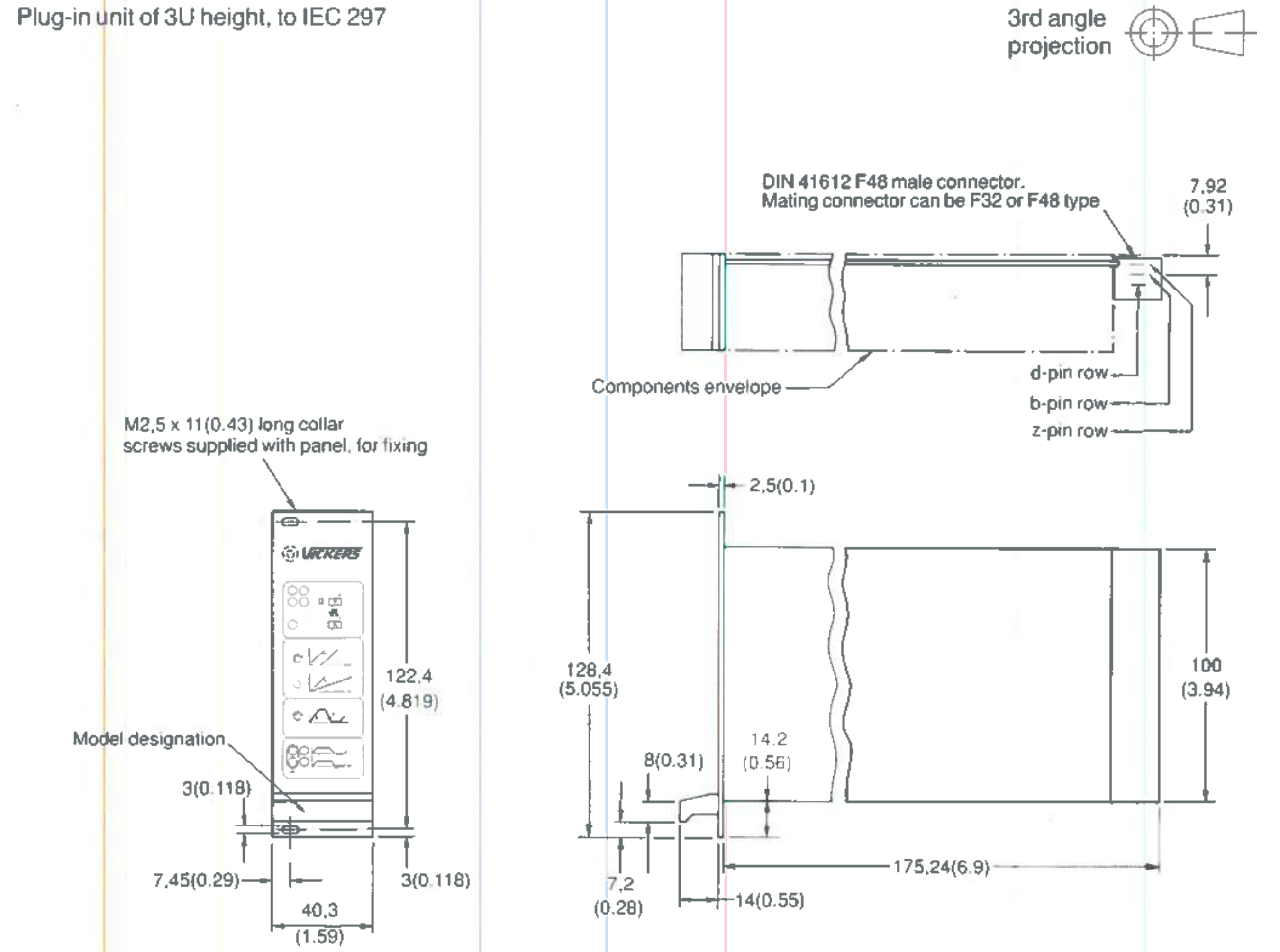
Continued on next page

Ambient temperature range	0 to 50°C (32 to 122°F)
Coding pin hole location	Between b and d3
Installation dimensions and front panel display	See below and next page
Mass	0,22 kg (0.48 lb)
Supporting products: Power supply unit options Electronic accessories Portable test equipment	See catalog C-2007 B

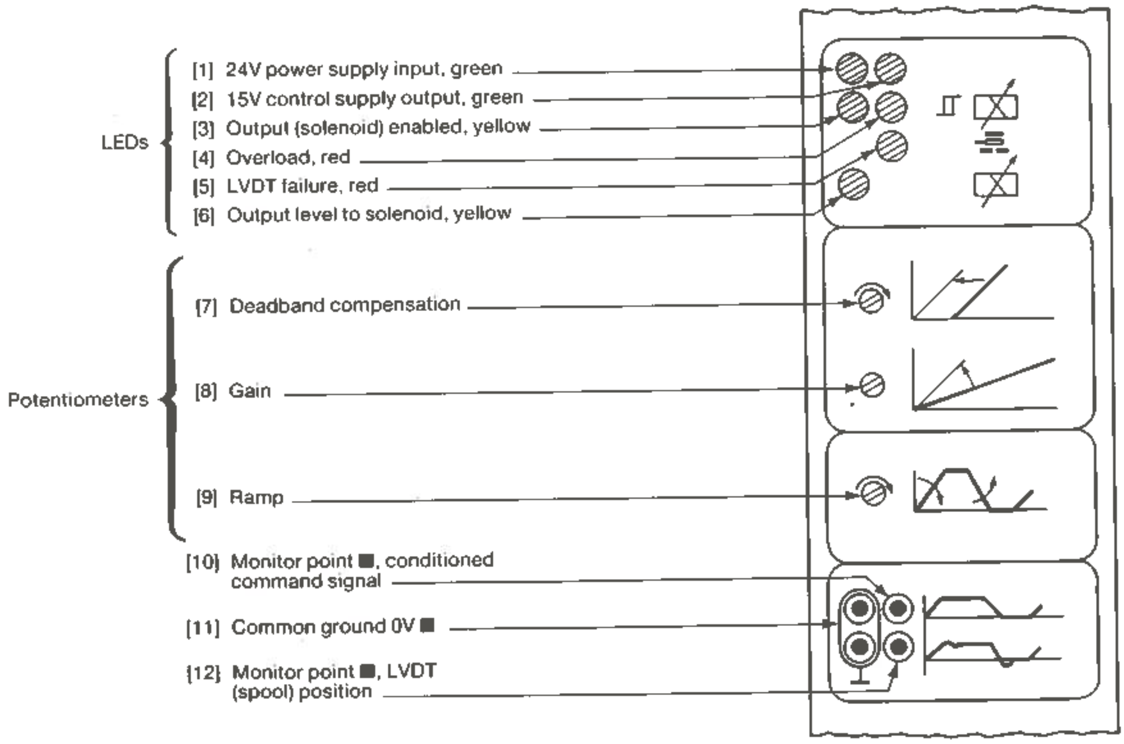
▲ From spool-closed position

10. Installation Dimensions for Amplifier in mm (inches)

Plug-in unit of 3U height, to IEC 297



Panel display, full size



■ Ø2 (0.0787 dia) sockets

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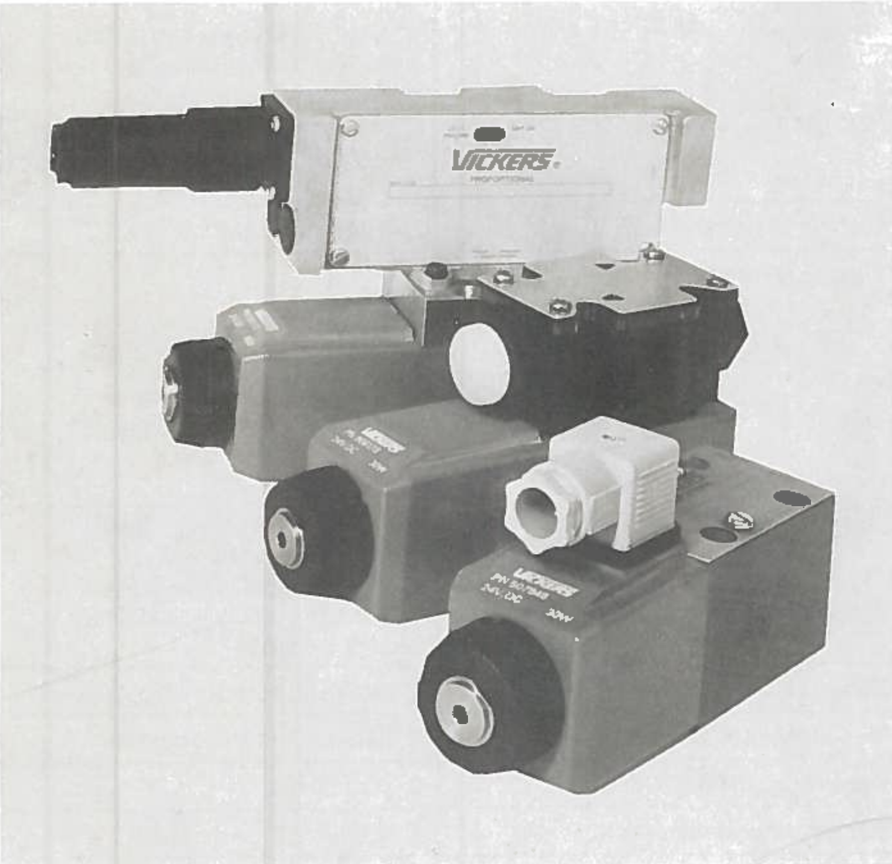
Proportional Pressure Relief Valves

KCG-3, 10 series
KACG-3, 10 series



1. General Description

An electro-hydraulic proportional relief valve, for mounting on ISO 4401 size 03 interface, designed to regulate pressure in a hydraulic system in proportion to an applied electrical input.

These open-loop, single-stage valves can be used for direct control of pressure in low flow systems, or for pilot control of larger pressure controls, and for such applications as pressure-controlled pumps.

Two model variants are available:

KCG-3
The valve in this basic form responds to a variable power supply to its solenoid; separate Vickers amplifiers, with PWM output stage and output current control, are available for driving this model.

KACG-3
The addition of an integral drive amplifier allows the pressure to be controlled from a 0 to +10V, or 0 to −10V command signal. The amplifier is mounted in a robust metal housing, sealed against ingress from spray and splashing of water and other fluids. Electrical connections are via a standard 7-pin plug.

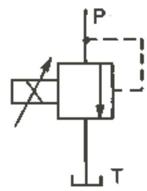
Factory set adjustments ensure high repeatability valve to valve.

2. Features and Benefits

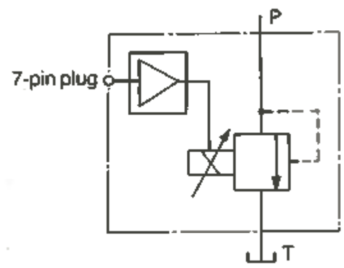
- Valve design ensures low hysteresis and good repeatability.
- Self-bleeding design simplifies installation and ensures consistent performance.
- When used for piloting a large pressure relief or reducing valve, a low minimum pressure is obtainable combined with fast and stable response to step input signals.

3. Functional Symbols

KCG-3



KACG-3



Interim Information

4. Model Code

Features within brackets ( ) are optional; all other features must be specified when ordering.

K(A)CG-3-(L) -* -*** - *1**

1 2 3 4 5

-1* -(EN)**

6 7

1 **Integral amplifier**
A = valve with integral amplifier
Omit for KCG-3 model.

2 **Valve configuration**
No symbol = RH build (solenoid at "B" end of body)
L = LH build (solenoid at "A" end of body)

3 **Pressure adjustment range**
For flow rate of 1 l/min (0.26 USgpm) and fluid viscosity 34 cSt (159 SUS)
40 = 1 to 40 bar (14.5 to 580 psi)
100 = 2 to 100 bar (29 to 1450 psi)
160 = 4 to 160 bar (58 to 2320 psi)
250 = 4 to 250 bar (58 to 3625 psi)
350 = 5 to 350 bar (72.5 to 5075 psi)

4 **Type of electrical connection**
For KCG models only:

Direct connection to coil
U = ISO 4400 (DIN 43650) connection (plug not supplied)

Conduit box, molded Nylon 66 (see 7 for aluminium alternative)
FJ = Conduit entry M20 thread
FTJ = With terminal strip; conduit entry M20 thread
FW = Conduit entry ½" NPT thread
FTW = With terminal strip; conduit entry ½" NPT thread

For KACG models only:
PD7 = 7-pin plug

5 **Input voltage to KACG valve or to external amplifier driving KCG valve**
G = 12V DC
H = 24V DC

6 **Design number, 10 series**
Subject to change. Installation dimensions unaltered for design numbers 10 to 19 inclusive.

7 **Special features**
"EN**" assigned as required.
EN75 = Die-cast aluminium conduit box; optional only when specifying "FJ" or "FW" in position 4.

5. Operating Data

Typical data with fluid at 34 cSt (159 SUS) and 40°C (104°F)

Max. pressures Port P: Operating range Static Port T: Operating Static	 See model code 3 350 bar (5075 psi) 2 bar (29 psi) ▲ 210 bar (3045 psi)
Max. flow, both models	3 l/min (0.8 USgpm)
Power supply (see model code 5) For KCG-3: "G" model "H" model For KACG-3: "G" model "H" model	 3.5A (1.45Ω) max. at 50°C (122°F) 1.6A (7.3Ω) max. at 50°C (122°F) 12V DC x 3.7A max. (10 to 20V including 10% peak-to-peak max. ripple) 24V DC x 1.8A max.(18 to 36V including 10% peak-to-peak max. ripple)
Command signal, KACG-3 only	0 to +10V DC, or 0 to –10V DC
7-pin plug connector, KACG-3 only: A B C D E F G	 Power supply +ve Power 0V Signal 0V +ve voltage command signal –ve voltage command signal Monitor output Protective ground
Gain adjustment, KACG-3 only	Factory set to give max. rated pressure with +10V or –10V command signal. Gain is user-adjustable from 25% to 125% of factory setting.■
Dither, KACG-3 only	Factory set, not user-adjustable
Monitor point signal, KACG-3	0.5V per amp solenoid current
Power stage PWM, KACG-3	2 kHz nominal
Repeatability, both models	≤±0.5%
Linearity, both models: Between 20% and 100% of pressure range	 ≤2.5%
Hysteresis: KCG-3 KACG-3	 ≤3% (with 35 mA RMS dither) ≤3% (with factory-set dither)
Valve to valve repeatability: KCG-3 KACG-3	 < 10% < 3% at factory settings

Continued on next page

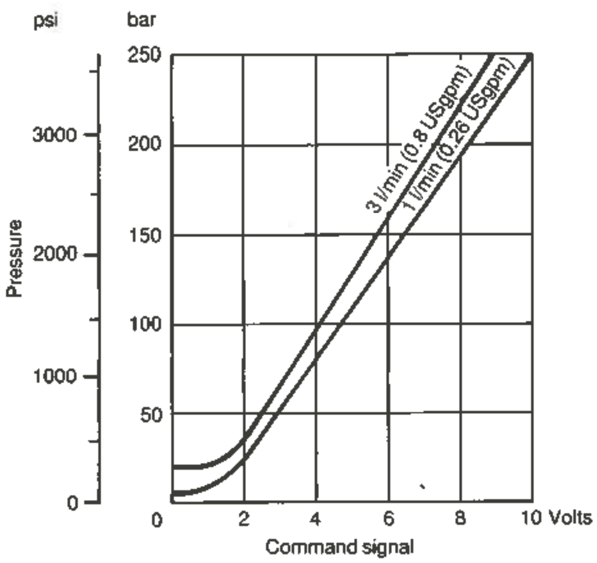
Protection:	
Electrical, KACG-3	Reverse polarity protected
Mechanical, both models	IEC 144, class IP65
Mounting interface	ISO 4401, size 03 ANSI/B93.7M, size D03 NFPA, D03 CETOP RP65H, size 3 DIN 24340, NG6
Mass:	
KCG-3	1,7 kg (3.8 lb)
KACG-3	2,1 kg (4.6 lb)

▲ *See "9. Installation Data".* ■ *Altering this factory setting will affect valve to valve interchangeability.*

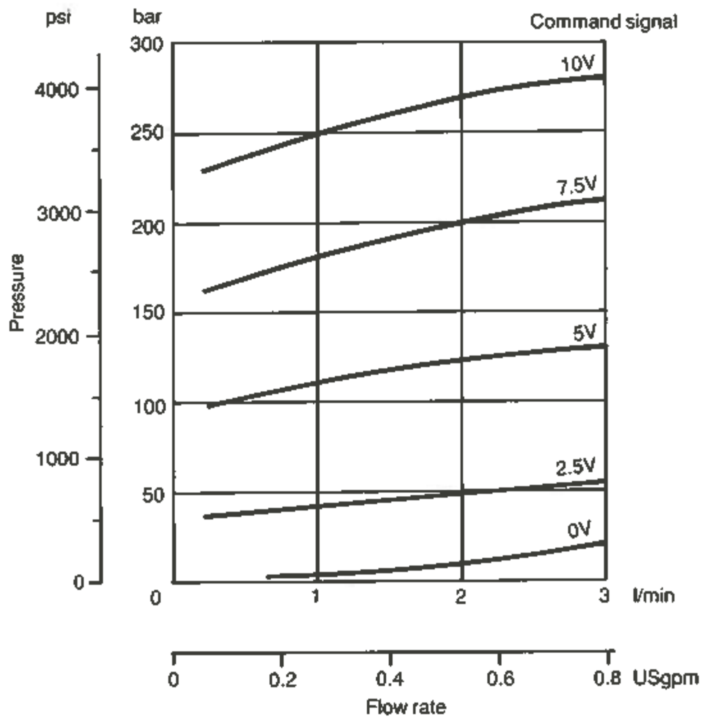
6. Performance Data

Typical data with fluid at 34 cSt (159 SUS) and 40°C (104°F).

Pressure Gain
Pressure v. command signal for KACG-3-250-PD7-H1-10



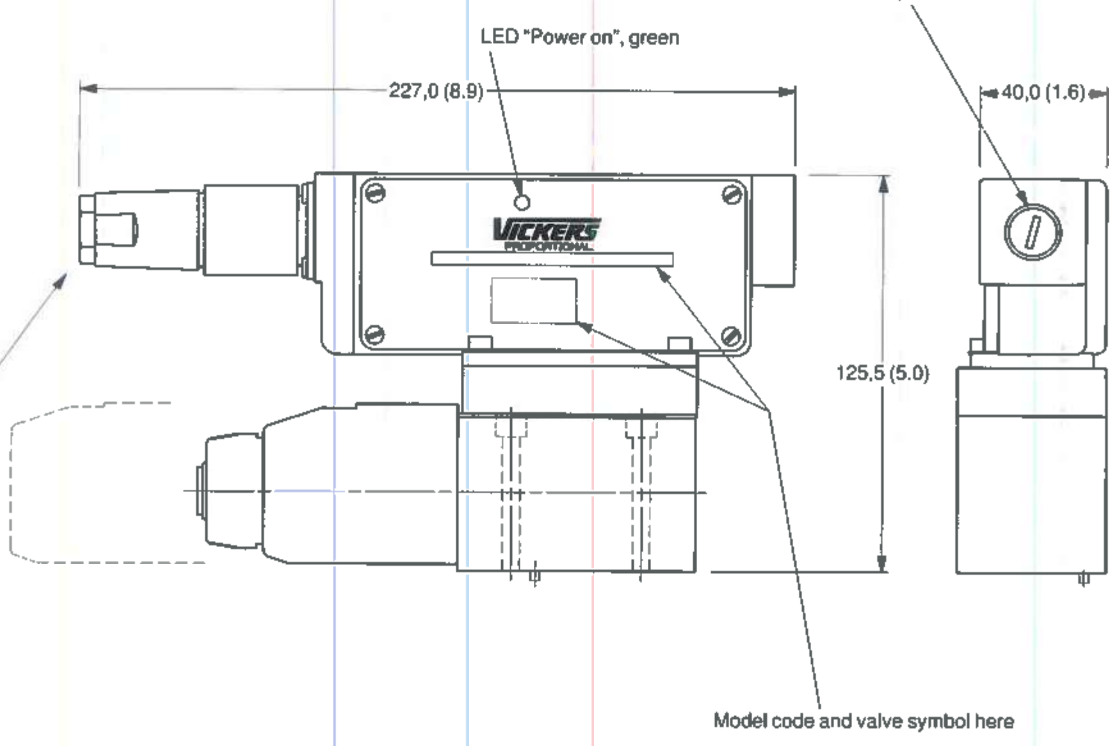
Pressure Override
Data for KACG-3-250-PD7-H1-10



Step Response
KCG and KACG models
0 to 100% step signal at conditions:
Flow.....................1 l/min(0.26 USgpm)
Volume under pressure ....25 cm^3 ($3.86\ in^3$)

Model code [4]	Pressure step	Time
40	1 to 40 bar (14.5 to 580 psi)	18 ms
100	2 to 100 bar (29 to 1450 psi)	20 ms
160	4 to 160 bar (58 to 2320 psi)	23 ms
250	4 to 250 bar (58 to 3625 psi)	28 ms
350	5 to 350 bar (72.5 to 5075 psi)	35 ms

KACG-3-***-PD7-H1-10
For KACG-β-L-***-PD7-H1-10, solenoid is mounted on "A" end of body, and amplifier is turned 180°



9. Installation Data

Mounting Attitude
There is no restriction on mounting attitude.

Connection from Port T
Port T should be piped directly to the reservoir with minimum restriction, because back pressure at this port is additive to the controlled pressure at port P. The recommended max. pressure at port T when the valve is controlling pressure is 2 bar (29 psi); the max. permissible pressure at port T is 210 bar (3045 psi).

Mounting Bolt Kits
Metric thread, M5-6g BK466835-M
Inch, 10-24UNC BKDG3698

Notes:
1. Bolts should be torqued to 7-9 Nm (63-80 lbf in) with threads lubricated.
2. If not using Vickers recommended bolt kits, bolts must be to grade 12.9 (ISO 898) or better.

When mounting K(A)CG-3 valves together with Vickers SystemStak™ valves (e.g. DGMC-3 relief valve), determine bolt requirements from the table in SystemStak™ catalog C-2027.

Subplates, Manifolds and Mounting Surface
For BSPF port threads and metric mounting bolt types, refer to data sheet V-1310 (see section "J" of catalog C-2005).

For SAE straight port threads and UNC (or metric) mounting bolt types, refer to data sheet I-517355 (see section "I" of catalog #400).

10. Spare Parts Data

Solenoid Coils
For KCG-3
Coils with ISO 4400 connection, for KCG-3-(L)-***-U-10
12V 02-123992
24V 02-123993
Coils with lead wires, for KCG-3-(L)-***-F**-10
12V 02-123994
24V 02-123995

For KACG-3
Coils not available for field replacement. Valves requiring coil replacement should be returned to Vickers.

Seal Kit
For KCG-3 and KACG models 02-138201

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Power Plugs for Proportional Valves

EPAD-A/SA/T-1A6-10 series

1. General Description

These plugs, conforming to ISO 4400 (DIN 43650) interface, offer low cost control solutions for direct solenoid operated, non-feedback hydraulic proportional valves, where certain combinations of the following features are required:

- Independently adjustable ramp up and ramp down of output (termed "delay up" and "delay down" respectively)
- Facility to select or cancel ramps (termed "lag cancel"): (type A)
- 3 independent settings of output level: (types SA and T)
- Two in-built timers: (type T)
- Gain adjustment (termed "max."): (type A)
- Deadband compensation (termed "jump" on analog input model): (type A)
- Minimum setting adjustment (termed "null"): (type SA)
- Analog input signal: (type A)
- Adjustable dither

The nominal supply voltage for all three models is 24V DC.

2. Features and Benefits

- Low cost
- Simple to install
- All adjustments can be made at the plug
- Reduction of EMI radiation
- Reduced heat generation
- Fully short circuit and reverse polarity protected
- Double solenoid valves can be controlled from one input signal (+10V to −10V)

3. Application

Control of proportional directional or pressure control valves in a wide variety of industrial machinery and mobile equipment applications where up to three output levels are required with shockless transients during level changes.

4. Model Codes

EPAD - ** - 1A6 - 1*

[1] [2] [3]

[1] **Function**

A = Analog input signal
Adjustable ramps
Ramp enable function
Adjustable gain, deadband and dither

SA = 3 on/off input signals
3 adjustable output levels
2 adjustable ramps
Adjustable minimum output
Adjustable dither

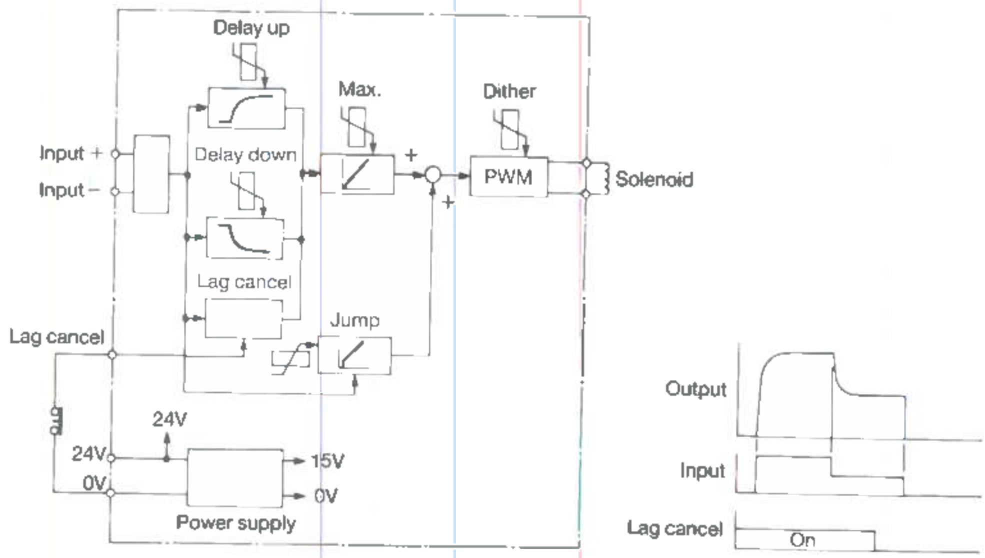
T = On/off input signal
2 adjustable timers
3 adjustable output levels
2 adjustable ramps
Adjustable dither

[2] **Output level**
1A6 = 1.6 A output current

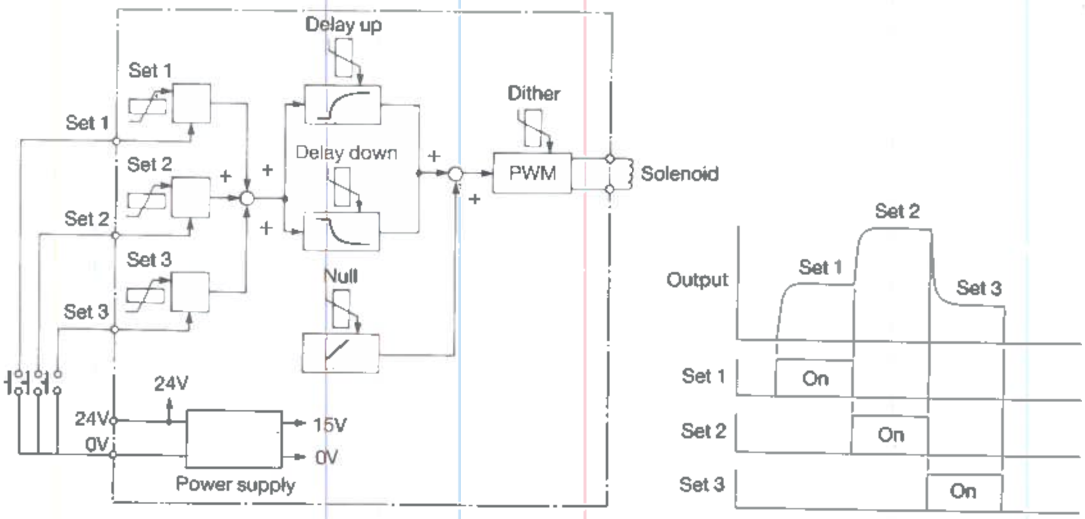
[3] **Design number, 10 series**
Subject to change. Installation dimensions and performance specification unchanged for design numbers 10 to 19 inclusive.

5. Electrical Block and Function Diagrams

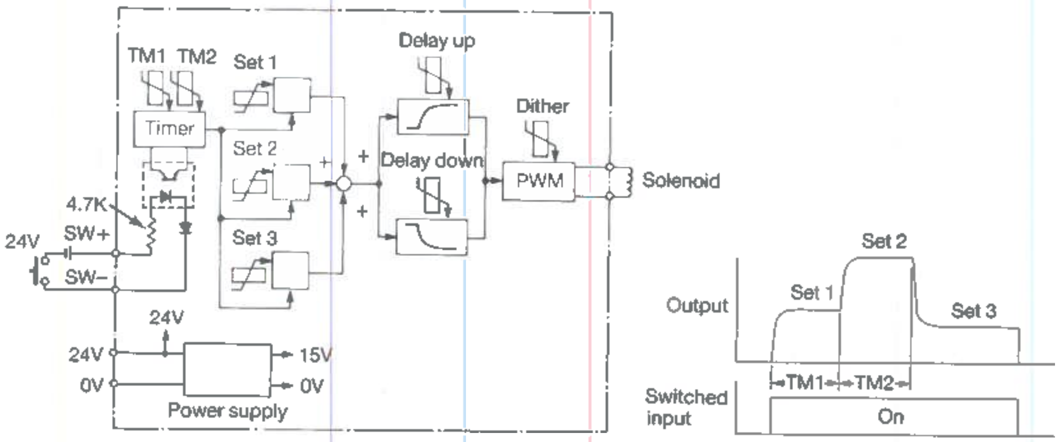
Model type EPAD-A-1A6-11



Model type EPAD-SA-1A6-11



Model type EPAD-T-1A6-11



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6. Operating Data

6.1 For all Models

Electrical:	
Power supply	19 to 28V DC inclusive of 10% max. ripple peak-to-peak
Output current	0 to 1.6A
Load resistance	6 to 10 ohms at 20°C (68°F)
Ramp adjustment	4.4 to 100 ms
Dither adjustment range	90 to 300 Hz
Mechanical:	
Mounting interface	ISO 4400 (DIN 43650)
Cable diameter	Ø 6 to 12 mm (0.24" to 0.48" dia)
Wire size	2,5 mm² (0.004 in²) max.
Cable clamp	Screw collet type
Protection	IEC 144 class IP65 when installed with seal correctly fitted. Fully short circuit and reverse polarity protected for voltages up to 30V DC
Ambient temperature range	–20°C to 70°C (–4°F to 158°F)
Mass	120g (0.26 lb)

6.2 For Model Type EPAD-A-1A6-11

Input signal:	0 to +10V or 0 to –10V
For output	>76 mV to 10V (+ or –)
For no output	0 to <76 mV (+ or –)
Gain adjustment range	50 to 180 mA/V
Deadband adjustment range	0 to 822 mA

6.3 For Model Type EPAD-SA-1A6-11

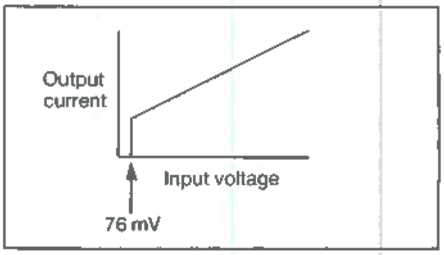
Set 1, Set 2, Set 3 adjustment range	0 to 1772 mA
Null adjustment range	0 to 835 mA

6.4 For Model Type EPAD-T-1A6-11

Set 1, Set 2, Set 3 adjustment range	0 to 1772 mA
Timers:	
TM1 and TM2 adjustment range	0 to 4 sec

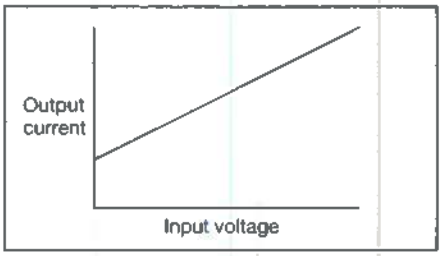
7. Performance Characteristics

Deadband Trimmer (model type A)



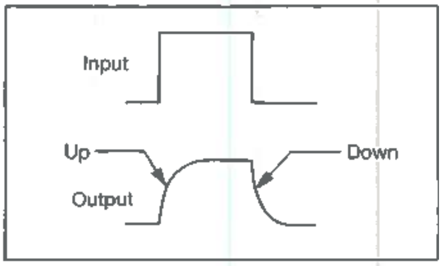
An output current is obtained when the input voltage is 76 mV or more. The level of output current at 76 mV input is set by the "jump" adjustment potentiometer.

Null Trimmer (model type SA)



A minimum output current can be set using the "null" potentiometer.

Ramp Trimmers (all model types)



From a step input signal, the output follows an exponential wave form The time for rise or fall of the output wave form is adjusted by the "delay up" and "delay down" potentiometers respectively.

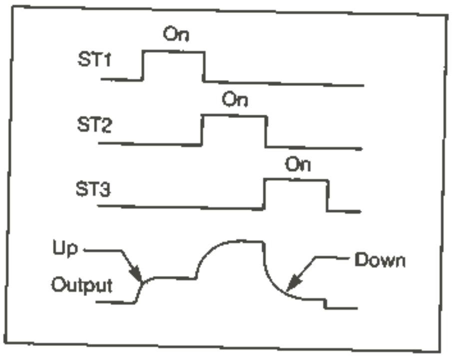
The ramp functions do not operate without an input signal.

Ramp Enable (model type A)
Connecting the "lag cancel" terminal to the 0V terminal (permanently or via an external switch) enables the ramp functions.

Dither Trimmer
The frequency of the PWM control is adjusted by the "dither" trimmer.

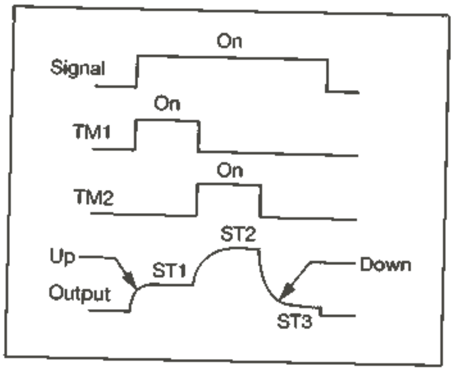
"Set" Trimmers (model types SA and T)
Three potentiometers, ST1, ST2 and ST3 allow three output signal levels to be set. The switching arrangements are different according to the model type:

- **For model type SA**
External switches are required to connect the three separate "set" terminals to the supply 0V terminal.



It is not recommended to have more than one input selected at any one time, except for overlap during change-over from one setting to the next setting. When two or more inputs are on simultaneously, the output is approximately the average of those setting levels.

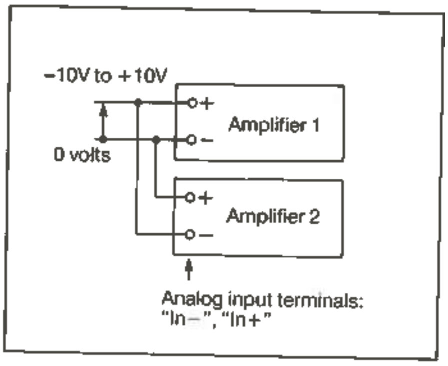
- **For model type T**



"Set 1" output level is selected for the time set by timer TM1. On completion of run time of TM1, timer TM2 then selects output level "Set 2". On completion of run time of TM2, the output level is as set by "Set 3" as long as the input signal is maintained.

Switching off the input signal gives zero output. The rise and fall of the output signal at each change-over (ST1 to ST2; ST2 to ST3) is controlled by the "delay up" and "delay down" potentiometers.

Use of Model Type A on Double Solenoid Valves

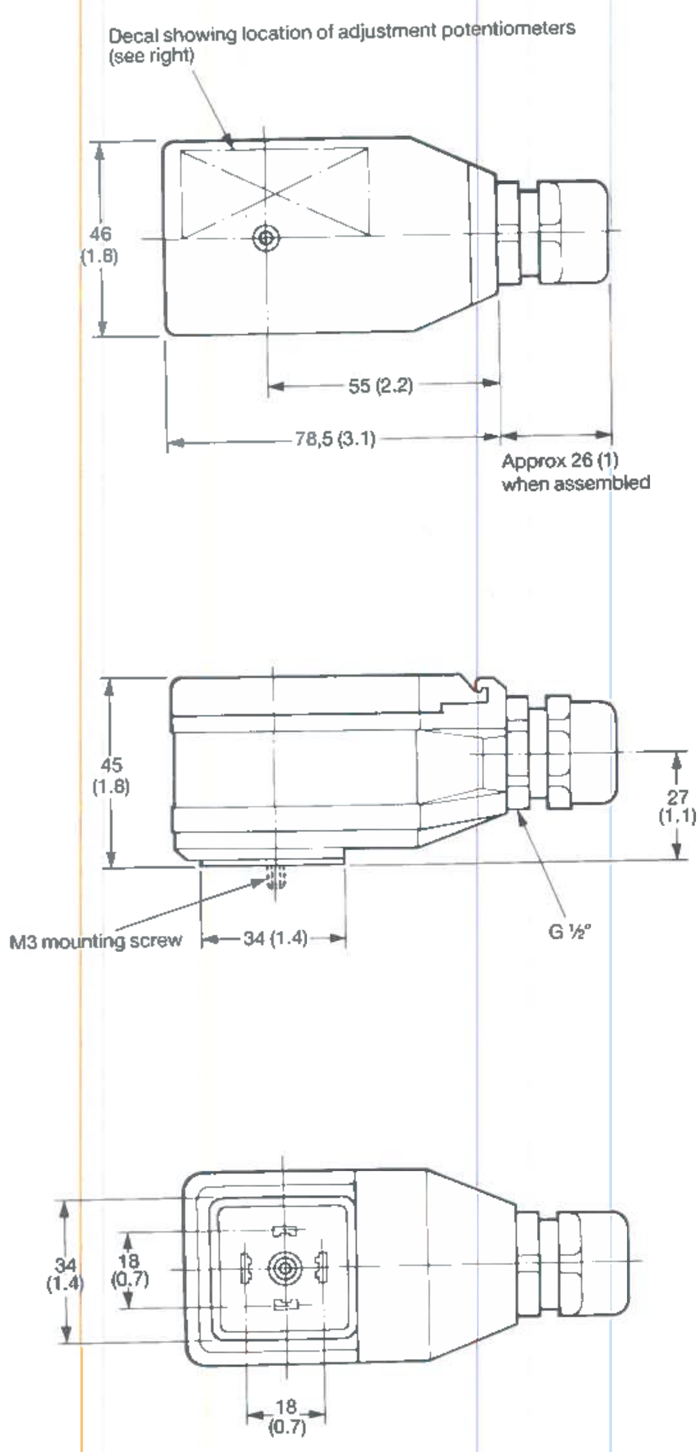


Two plugs can be controlled from one input signal of −10V to +10V as shown. Amplifier plug 1 is controlled when the input signal is 0 to +10V; amplifier plug 2 is controlled when the input signal is 0 to −10V.

8. Installation Dimensions in mm (inches)

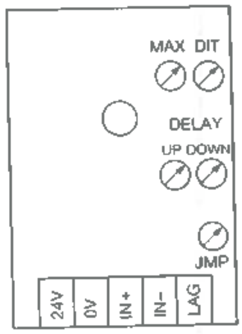
All models

3rd angle projection

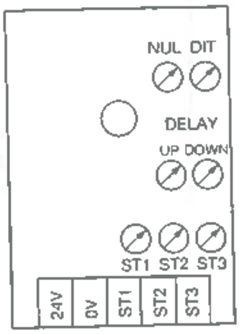


Terminal identification and potentiometer locations

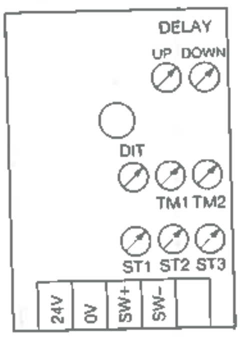
EPAD-A-1A6-11



EPAD-SA-1A6-11



EPAD-T-1A6-11



9. Ordering Procedure

Specify requirements by full model code.

VICKERS

Directional Control Valves

DG3V-5, 10 series
DG5V-5, 10/20 series
ISO 4401 size 05*; NFPA D05*

* *With additional pilot ports*

1. Basic Characteristics

Max. operating pressure ....315 bar (4567 psi)
Max. flow at max. pressure ....160 l/min (42 USgpm)

2. General Description

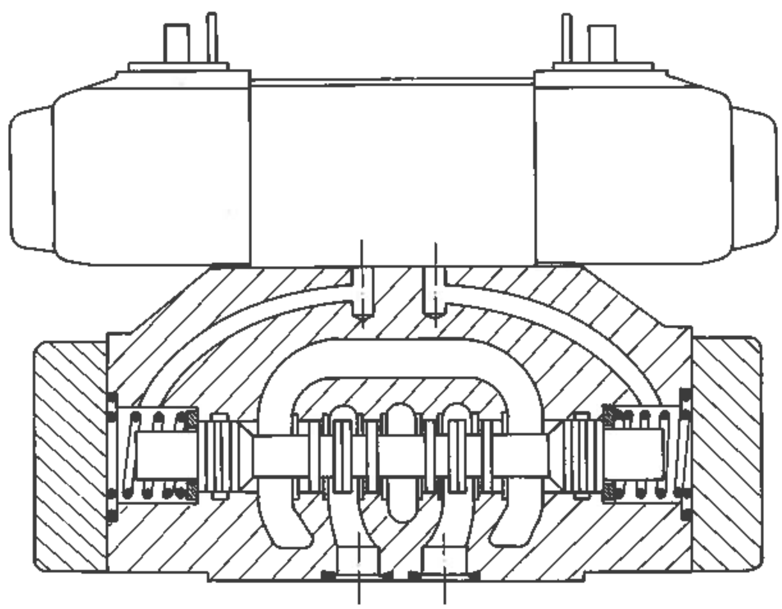
These valves are used for controlling the starting, stopping and direction of fluid flow.

Two types of control are available:
- Hydraulic pilot pressure (DG3V-5 models)
- Integrally-mounted solenoid operated pilot valves (DG5V-5 models) comprising spring-offset, spring-centered and detented versions. Pilot pressure and drain can be independently configured for internal or external connection.

All spool types have been designed to provide good low-shock, fast-response characteristics which can be enhanced by an optional pilot choke module to control the speed of travel of the main spool.

3. Sectional Illustration

DG5V-5-2C



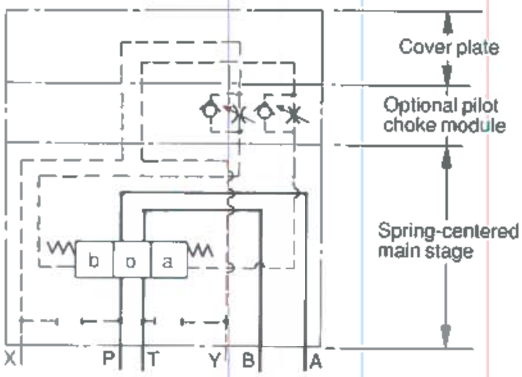
4. Functional Symbols

The diagrams show the spring-centered main stage with:

1. The cover plate and optional pilot choke module available in the DG3V models.
2. The solenoid operated pilot valve types, and the optional pilot choke module available in the DG5V models.

For solenoid identities "a" and/or "b" see page 6.

Direct pilot operated
DG3V-5-**C



Solenoid controlled, pilot operated
DG5V-5 models

For DG5V-5-**A

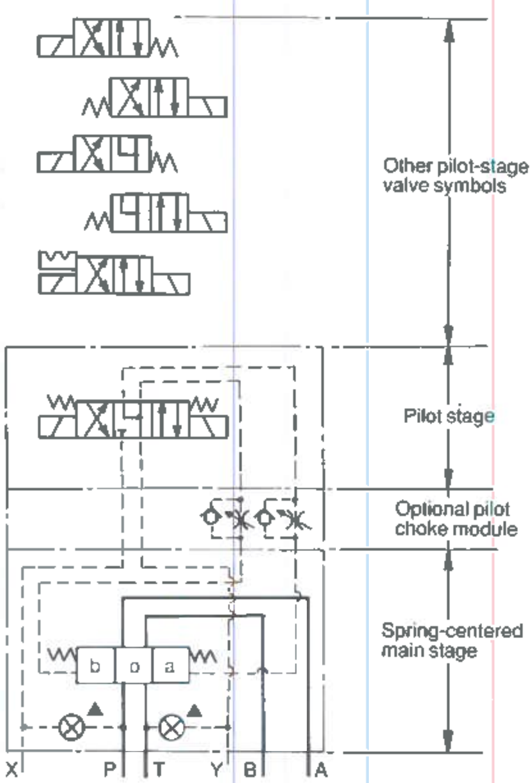
For DG5V-5-**AL

For DG5V-5-**B

For DG5V-5-**BL

For DG5V-5-*N

For DG5V-5-**C



Example shown: DG5V-5-**C-2-E-(V)M-****-**-10

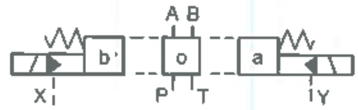
▲ *Plugs fitted according to "internal" or "external" pilot supply and drain requirements; see model code positions* 5 *and* 6.

Spool Symbols

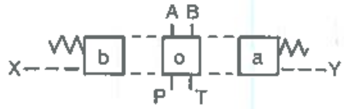
Simplified symbols of 3-position spools showing switching positions "a" and "b", spring-centered position "o" and transient conditions.

3-Position, Spring-centered

Double solenoid controlled, pilot operated
DG5V-5-**C



Hydraulic pilot operated
DG3V-5-**C



Spool types

0

1

2

3

6

8

11

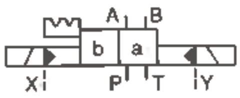
31

33

52

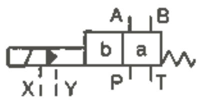
2-Position

Double solenoid, detented, pilot operated
DG5V-5-*N



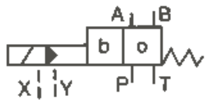
Spools available with this model: * = type 2

Single solenoid, spring-offset, pilot operated
DG5V-5-*A



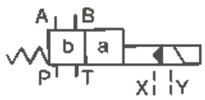
Spools available with this model: * = type 2

DG5V-5-**B



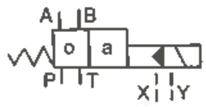
Spools available with this model:
** = 0, 1, 2, 3, 6, 8, 52

DG5V-5-*AL



Spools available with this model: * = type 2

DG5V-5-**BL



Spools available with this model:
** = 0, 1, 2, 3, 6, 8, 52

5. Model Codes

Features in brackets are optional; all other features must be specified when ordering.

For DG5V solenoid-controlled models, other features/options on the DG4V-3/3S 60-design pilot valve may be made available as applicable and subject to quantity required. See catalog C-2015A for details:

- For AC voltages: DG4V-3 (high performance) models
- For DC voltages: DG4V-3S (standard performance) models

For Direct Pilot-operated Models

(F3-)DG3V-5- ** (-*) -1***

[1] [2] [3] [4] [14]

For Solenoid-controlled, Pilot-operated Models

(F3-)DG5V-5- ** (-*)(-E)(-T)(*) (-V) M -*** * -* -* -****

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14]

[1] **Special seals for phosphate esters**
Omit for standard seals (see "Hydraulic Fluids" section)

[2] **Spool type**
See "Functional Symbols"

[3] **Spool spring arrangement**
For DG3V-5
C = Hydraulic pilot-operated, 3-position, spring-centered

For DG5V-5 ▲
A = Single solenoid, spring-offset to position "a"; energize solenoid for position "b"
AL = Single solenoid, spring-offset to position "b"; energize solenoid for position "a"
B = Single solenoid, spring-offset to center position "o"; energize solenoid for position "b"
BL = Single solenoid, spring-offset to center position "o"; energize solenoid for position "a"
C = Double solenoid, spring-centered; energize solenoid for position "a" or "b"
N = Double solenoid: energize solenoid for position "a" or "b"; detent held in last selected position ■

▲ *All main-stage assemblies are spring-centered. The conditions described depend on the availability of pilot pressure in excess of 4,5 bar (65 psi) to move the spool against these springs. This is particularly important when using external pilot pressure supply.*
■ *Subject to availability of pilot pressure.*

[4] **Spool shift control**
2 = Pilot choke adjustment for both directions of spool travel
Omit if not required

[5] **Pilot pressure supply**
E = Valve configured for external pilot supply to port "X"
Omit for internal pilot supply (port "X" must be blanked off, e.g. at the valve mounting face, when using internal pilot supply)

[6] **Pilot drain arrangement ◆**
T = Valve configured for internal pilot valve drain (port "Y" must be blanked off, e.g. at the valve mounting face, when using internal drain)
Omit for external drain from port "Y"
◆*See [13] for pressure limits*

[7] **Pilot valve manual override option**
No symbol = Plain override(s) in solenoid end(s) only
H▼ = Water-resistant override(s) on solenoid end(s)
▼ *See catalog C-2015A for details*

[8] **Solenoid identity method**
V = Solenoid "A" at port "A" end of pilot valve body and/or solenoid "B" at port "B" end of pilot valve body, independent of main-stage port locations and spool type.
Omit (except as noted below) for

US ANSI B93.7 standard requiring solenoid "A" energization to connect main ports P and A and/or solenoid "B" energization to connect P and B, independent of solenoid location.

Note: The "V" code is always used for valves with type "8" spool as the solenoid identity is the same for both methods of identification.

9 Start of electrical features

M = Start of electrical features codings

10 Solenoid type/connection(s)

U = ISO 4400 (DIN 43650) mounting ✣
FJ = M20 thread conduit box
FTJ● = M20 thread conduit box with terminal connector strip
FW = ½" NPT thread conduit box
FTW● = ½" NPT thread conduit box with terminal connector strip

✣ *Female connector to be supplied by customer.*
● *See catalog C-2015A for details.*

11 Indicator lights

For FTJ and FTW type coils only
L = Lights fitted (e.g. FTJL, FTWL)
No symbol = Lights not fitted

For U-type coils use separate plug with integral light; see catalog C-2015A for details.

12 Coil rating

A = 110V AC 50 Hz
B✦ = 110V AC 50 Hz/120V AC 60 Hz
C = 220V AC 50 Hz
D✦ = 220V AC 50 Hz/240V AC 60 Hz
G = 12V DC
H = 24V DC

✦ *For 60 Hz or dual frequency*

13 Port T or Y maximum pressure †

5 = 100 bar (1450 psi), for DC solenoids only
6 = 160 bar (2300 psi), for AC solenoids only

† *This pressure rating (determined by the pilot valve drain port) is applicable to:*
1. Port T when using internal drain, ("T" at position 6)
2. Port Y when using external drain, (no symbol at position 6)

14 Design number, 10 & 20 series

Subject to change. Installation dimensions unaltered for design numbers 10 to 19/20 to 29 inclusive.

10 = DG5V-5 with AC solenoids DG3V-5
20 = DG5V-5 with DC solenoids

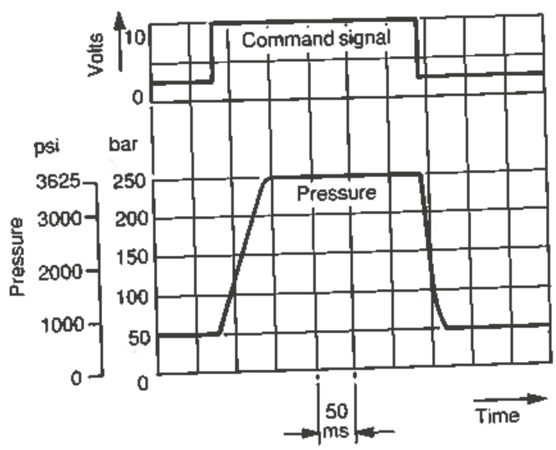
6. Operating Data

Based on petroleum oil at 36 cSt (168 SUS) and at 50°C (122°F).

Maximum pressures	
For DG3V-5:	
All ports	315 bar (4567 psi)
For DG5V-5 externally drained:	
Ports P, A, B, T, X	315 bar (4567 psi)
Port Y:	
With AC solenoids	160 bar (2300 psi)
With DC solenoids	210 bar (3045 psi)
For DG5V-5 internally drained:	
Ports P, A, B, X, Y	315 bar (4567 psi)
Port T:	
With AC solenoids	160 bar (2300 psi)
With DC solenoids	210 bar (3045 psi)
Maximum flow	160 l/min (42 USgpm)
Minimum pilot pressure	See "8. Control Data"

For all data related to the DG4V-3/3S 60-design pilot valve, refer to catalog C-2015A

Sample data for KACG-3-250-PD7-H1-10, measured with flow of 1 l/min (0.26 USgpm) and 80 cm³ (4.88 in³) volume under pressure.



Hydraulic Fluids
Materials used in these valves are compatible with anti-wear hydraulic oils, water-in-oil emulsions, water glycols and non-alkyl-based phosphate esters. The extreme operating viscosity range is from 500 to 13 cSt (2270 to 70 SUS), but the recommended running range is from 54 to 13 cSt (245 to 70 SUS). For further information about fluids see "Technical Information" leaflet B-920 or I-286S.

Filtration Requirements
Up to 200 bar (3000 psi): ISO 4406 20/16
Above 200 bar (3000 psi): ISO 4406 18/14

Temperature Limits
Ambient ....–20°C to +50°C (–4°F to 122°F)

Fluid temperatures

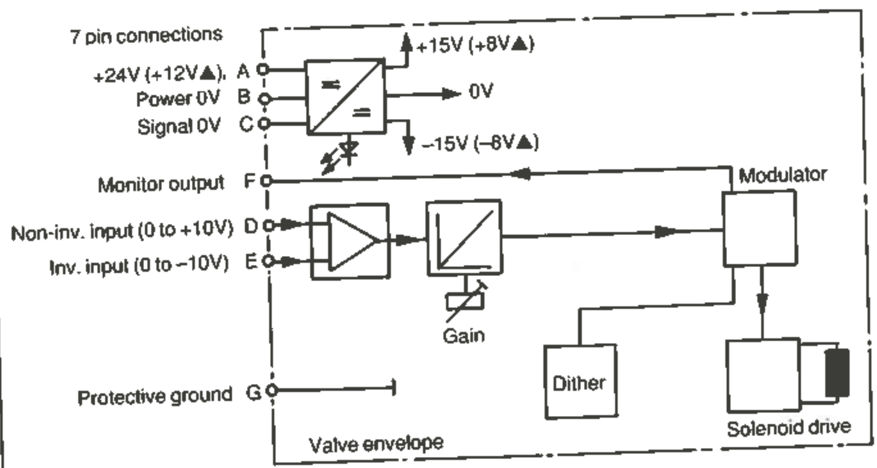
	Petroleum oil	Water-containing
Min.	–20°C (–4°F)	+10°C (+50°F)
Max.*	+70°C (+158°F)	+54°C (+129°F)

* *To obtain optimum service life from both fluid and hydraulic system, 65°C (150°F) normally is the maximum temperature except for water-containing fluids.*

For synthetic fluids consult manufacturer or Vickers representative where limits are outside those for petroleum oil.

Whatever the actual temperature range, ensure that viscosities stay within the limits specified in the "Hydraulic fluids" section of catalog GB-C-2007B.

7. Electrical Block Diagram, KACG-3

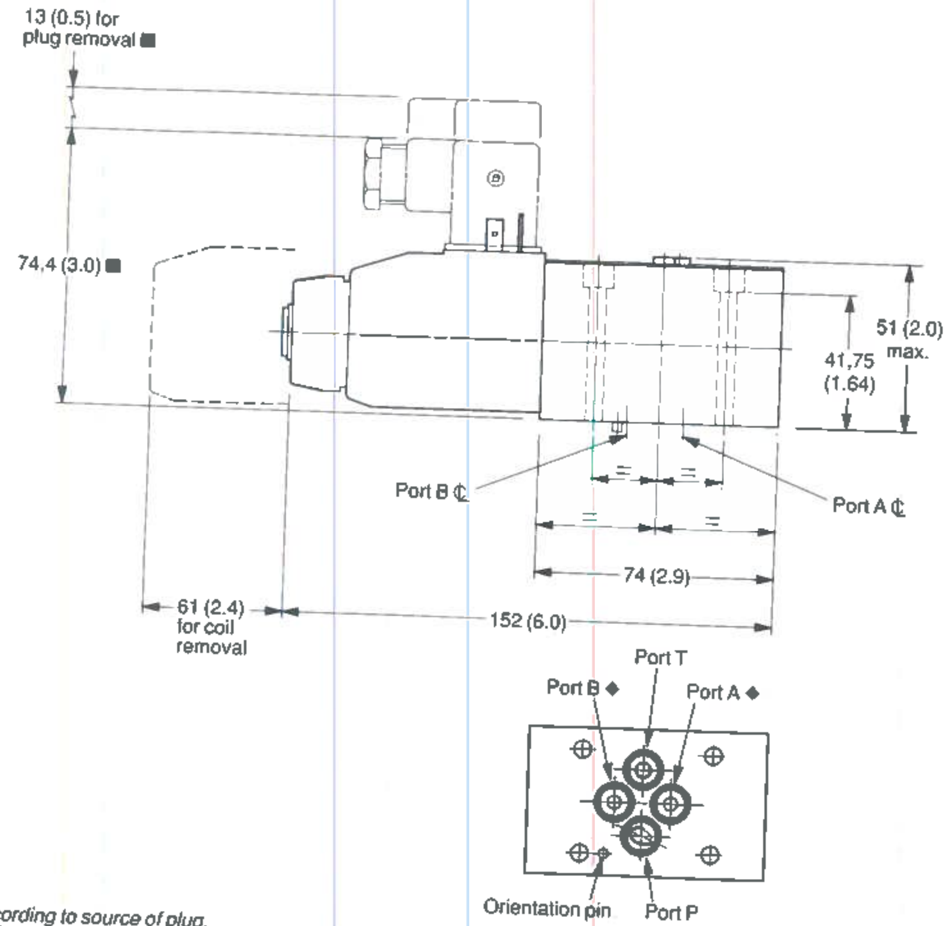


▲ *Values for 12V models, "G" in model code* [5]
All other values for 24V models, "H".

8. Installation Dimensions in mm (inches)

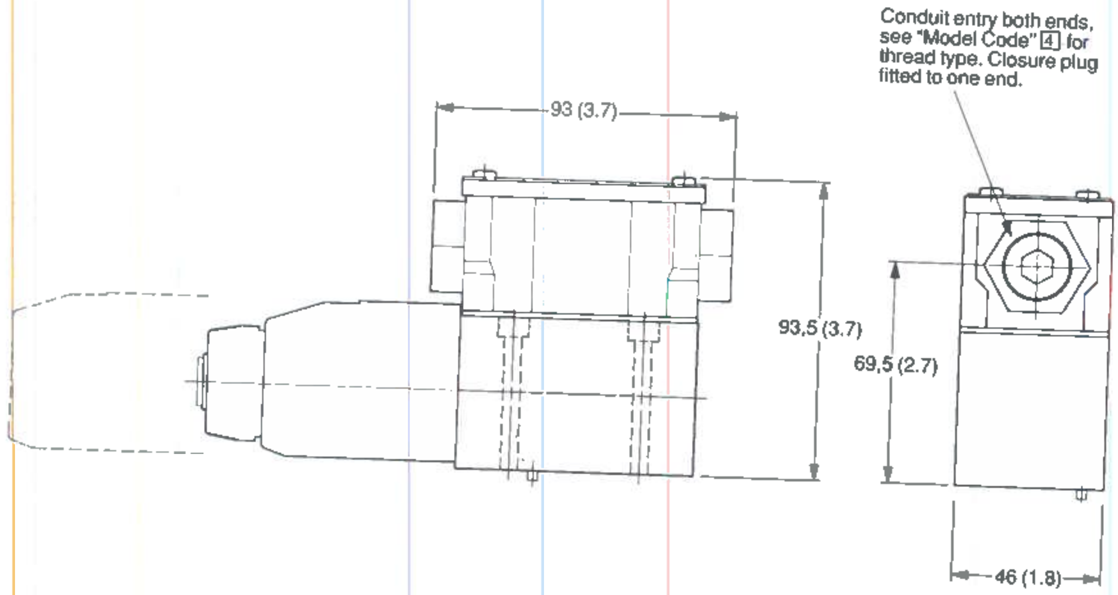
KCG-3-***-U-10
For KCG-3-L-***-U-10, solenoid is mounted on "A" end of body

3rd angle projection



■ *May vary according to source of plug.*
◆ *Ports A and B are blind holes with O-seal recesses.*

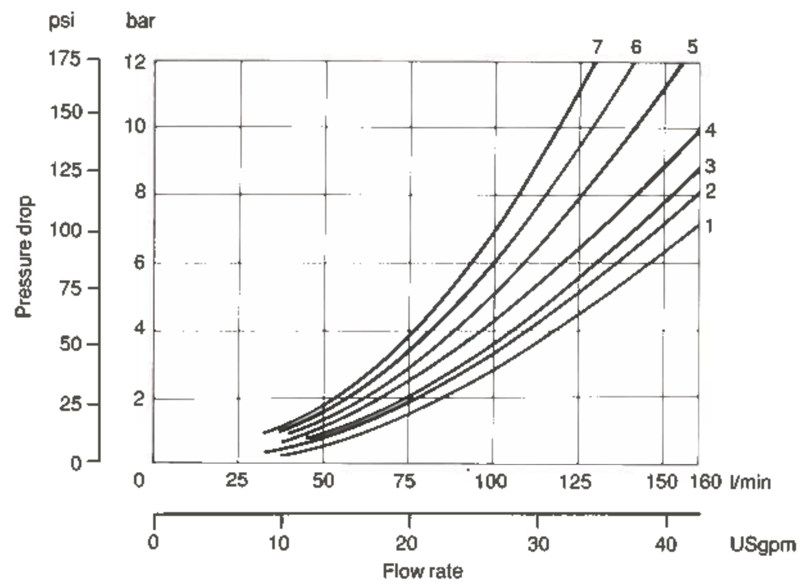
KCG-3-***-F**-10
For KCG-3-L-***-F**-10, solenoid is mounted on "A" end of body



7. Performance Data

Pressure Drops

Based on petroleum oil at 36cSt (168 SUS) and at 50°C (122°F).



Spool type	For positions "a" or "b": P to A	B to T	P to B	A to T	For position "o": A to T	B to T	P to T
0	4	4	1	4	1	3	5
1	1	4	1	4	3	–	6
2	1	2	1	5	–	–	–
3	2	3	1	4	5	–	–
6	1	2	1	3	–	–	–
8	4	2	2	6	–	–	7
11	4	1	3	4	–	7	5
31	3	3	3	4	–	4	–
33	2	2	3	4	–	–	–
52	2	3	3	5	–	–	–

Hydraulic Fluids

These valves are suitable for use with hydraulic oils, water-in-oil emulsions and water glycols.

The extreme operating range is from 500 to 13 cSt (2270 to 70 SUS) but the recommended running range is 54 to 13 cSt (245 to 70 SUS).

Temperature Limits

Minimum ambient .... –20°C (–4°F)

Maximum ambient

DG3V-5 models	As for fluids, see "Fluid Temperatures" below
DG5V-5 models With AC dual frequency coils: At 50 Hz and 107% voltage At 50 Hz and 110% voltage At 60 Hz and 107% voltage At 60 Hz and 110% voltage	 40°C (104°F) 30°C (86°F) 50°C (122°F) 40°C (104°F)
With AC single frequency (50 Hz) coils: At 50 Hz and 110% voltage	 40°C (104°F)
With DC coils at 110% voltage	70°C (158°F)

Fluid temperature

	Petroleum oil	Water-containing
Min.	–20°C (–4°F)	+10°C (+50°F)
Max.*	+80°C (+176°F)	+54°C (+130°F)

* *To obtain optimum service life from both fluid and hydraulic system, 65°C (150°F) is the recommended maximum fluid temperature, except for water-containing fluids.*

For synthetic fluids consult fluid manufacturer or Vickers where limits are outside those for petroleum oil.

Filtration Requirements

Up to 200 bar (3000 psi): ISO 4406 20/16

Above 200 bar (3000 psi): ISO 4406 18/14

8. Control Data

Pilot Pressures

Differential pressure, i.e. pilot pressure at port P (or port X) minus pilot drain pressure at port T (or port Y).

Maximum ....315 bar (4567 psi)

Minimum (for max. flow):

For spool types 0, 1, 8◆, 11 .... 4,5 bar (65 psi)

For spool type 6 ....8 bar (116 psi)

For spool types 2, 3, 31, 33, 52 ....10 bar (145 psi)

All main stages are spring-centered. Selection of spool offset positions "a" or "b" requires pilot pressure equal to or in excess of the above minimums to move the spool against the spring force. This is particularly important when using external pilot pressure supply.

◆ *When using a type 8 spool with the valve configured for internal pilot supply, flow through the valve should be at least 80 l/min (21 USgpm) to generate 4,5 bar (65 psi) pressure drop when the spool is in the center position (flow P to T).*

DG5V-5-*N

The spool of the pilot valve of this model is detent-held in its last selected position, and the spool will remain ▲ in this position after the solenoid has been de-energized.

The main stage is spring-centered and requires at least minimum pilot pressure to hold the spool in its offset ("detent held") position. When pilot pressure falls below the recommended minimum, the main-stage spool will move to position "o" under the action of the centering springs. The system designer should ensure that under these conditions the flow condition at center position "o" is appropriate for the application.

▲*See comment in "10. Mounting Attitude"*

Pilot Choke Module

This allows the velocity of the main-stage spool to be controlled, thereby reducing transient shock conditions. For best results a constant, low pilot pressure is recommended.

Solenoid Identification

For model code variants:

Position [4], spool spring arrangement

Position [8], solenoid identity method

Model	Spool types	Solenoid identity Main port A end	Main port B end
DG5V-5-*A/B(-*)(-E)(-T)(-**)-M	All except "8"	–	B
DG5V-5-*A/B(-*)(-E)(-T)(-**)-VM	All except "8" "8" only	– B	A –
DG5V-5-*AL/BL(-*)(-E)(-T)(-**)-M	All except "8"	A	–
DG5V-5-*AL/BL(-*)(-E)(-T)(-**)-VM	All except "8" "8" only	B –	– A
DG5V-5-*C/N(-*)(-E)(-T)(-**)-M	All except "8"	A	B
DG5V-5-*C/N(-*)(-E)(-T)(-**)-VM	All spools	B	A

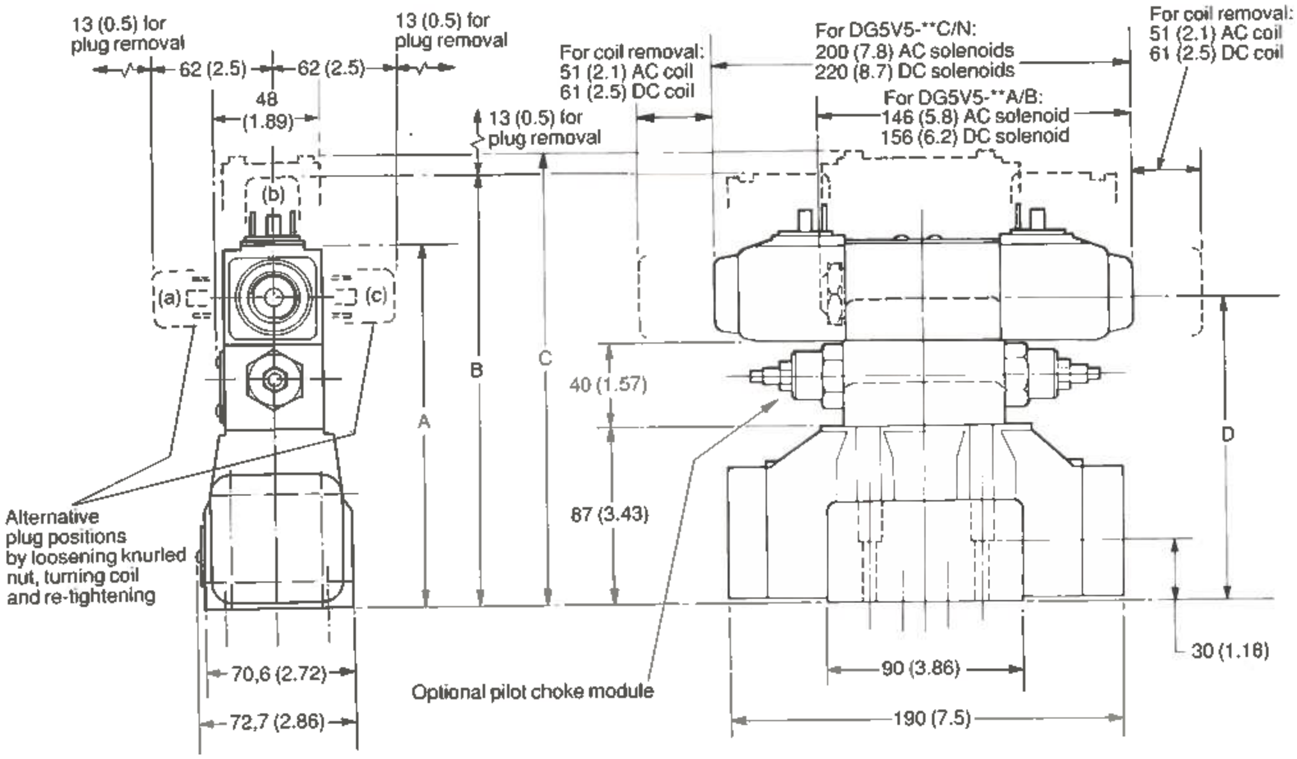
9. Installation Dimensions in mm (inches)

3rd angle projection

All models

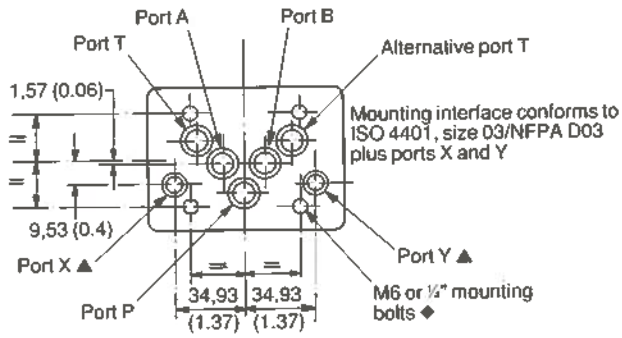
Single solenoid models:

DG5V-5-*A DG5V-5-**B DG5V-5-8BL	As shown	DG5V-5-*AL DG5V-5-**BL DG5V-5-8B	Solenoid and pilot valve end cap interchanged



Dimension = max. height for valve build	With pilot choke	Without pilot choke
A = DG5V with ISO 4400 coil connector in position (a) or (c)	178 (7.0)	138 (5.5)
B = DG5V with ISO 4400 coil connector in position (b)	214 (8.5)	174 (6.9)
C = DG5V with conduit box	218 (8.6)	178 (7.0)
D = DG3V	152 (6.0)	112 (4.4)

▲ *Mating holes in suplate/manifold block must not exceed Ø 6,0 (0.25 dia)*
◆ *Torque values:*
Up to 210 bar (3045 psi): 12 to 14 Nm (9 to 10 lbf ft)
Up to 315 bar (4567 psi): 18 to 21 Nm (14 to 16 lbf ft)



10. Mounting Attitude

Unrestricted except for no-spring detented model DG5V-5-*N, which may be affected by severe vibration or shock, especially if a solenoid is not energized.

Hydraulics, electro-hydraulics, electronics: high performance products with quality standards second to none – for enhanced productivity and economy.

Vickers components and systems are used extensively for in-plant machinery, mobile vehicles, automotive equipment, aerospace and marine applications.

Presented by:

VICKERS
A TRINOVA Company

GB-C-2047-3.91-1.0-PA-HI

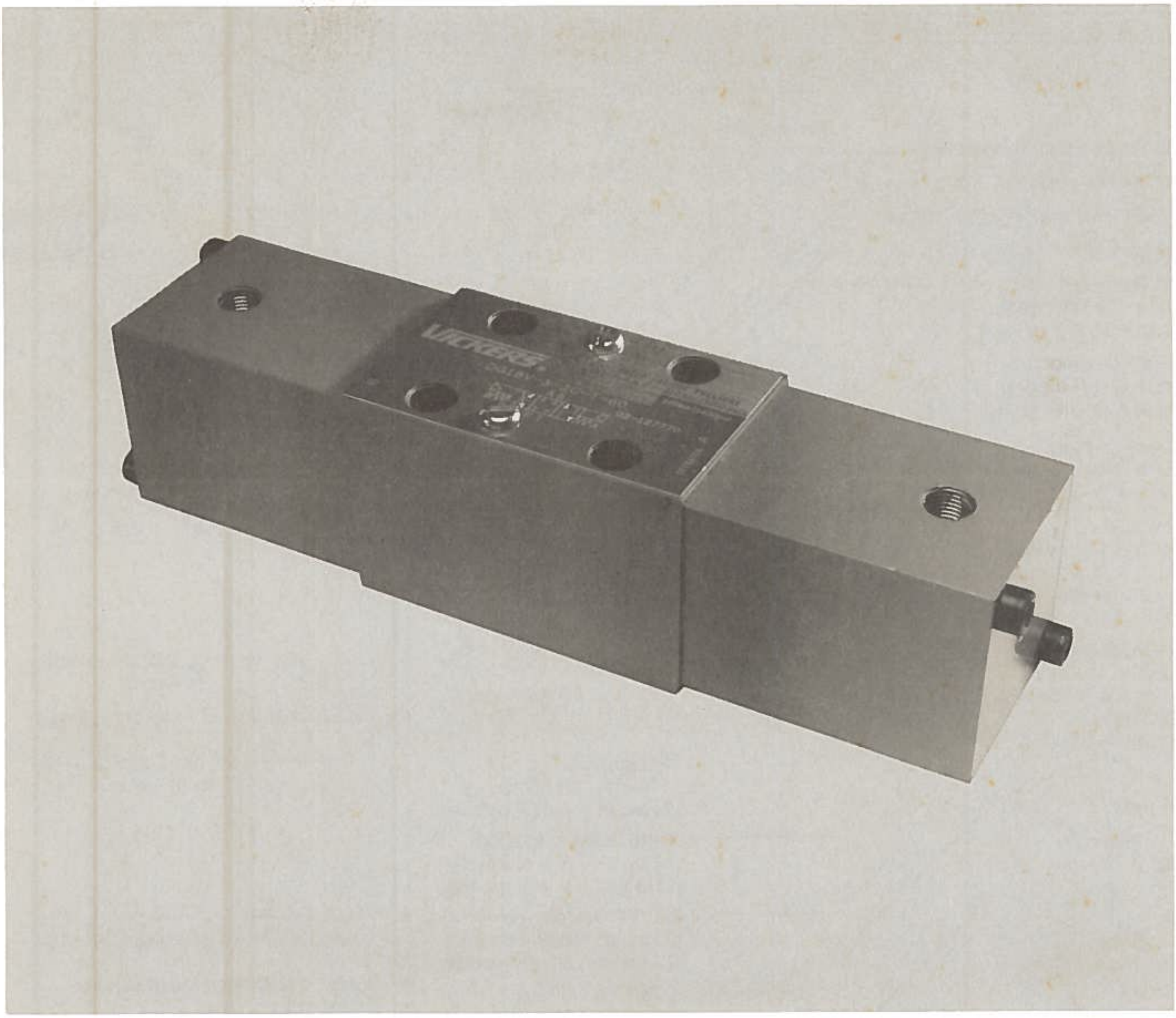
Printed in Germany

Service Data

VICKERS

Air Pilot Operated Directional Control Valve

DG18V-3-*A/B/F(L)-(P2)-(V)-*-60
DG18V-3-*C/N-(V)-*-60



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I-3896-S

Spool Type	Model	Spool
* 0	A	617498
	B, C, F	617121
	N	890189
** 1, 11	B, C, F	458263
* 2	A	617120
	B, C, F	617118
	N	617126
**** 22	A	617122
*** 3, 31	B, C, F	617124
33	B, C, F	617123
* 6	A	890188
6	B, C, F	617119
	N	617341
**** 7	A	458151
7	B, C, F	617125
***** 8	B, C, F	458950

SPOOL ASSEMBLY NOTE:

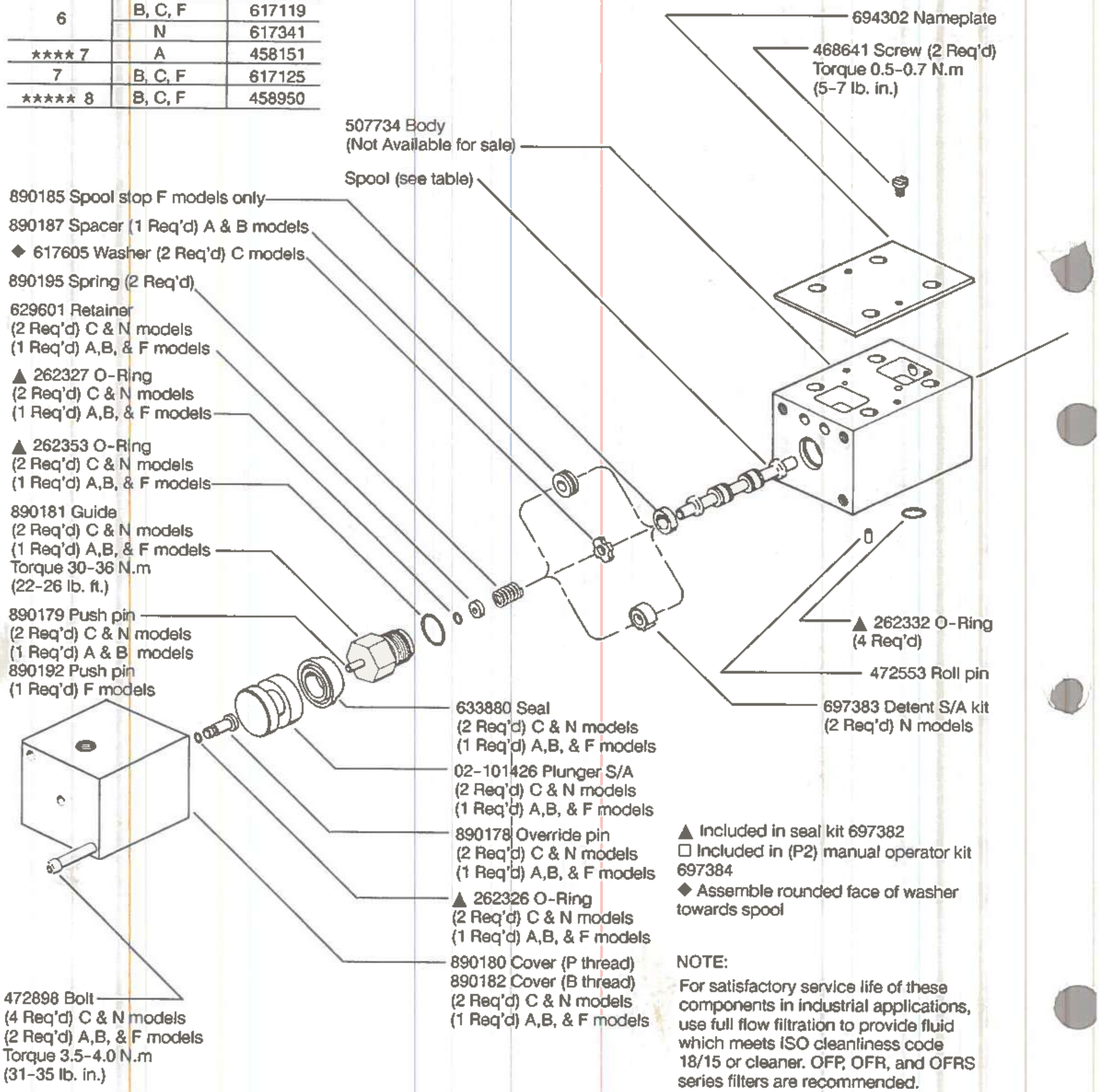
* Assemble type "OA", "2A", and "6A" spool in body with longer end land opposite of operator.

** Assemble type "1" spool in body with narrow center land towards "A" port. Assemble type "11" spool in body with narrow center land towards "B" port.

*** Assemble type "3" spool in body with narrow center land towards "A" port. Assemble type "31" spool in body with narrow center land towards "B" port.

**** Assemble type "7A" and "22A" spool in body with reduced longer end Dia. towards operator.

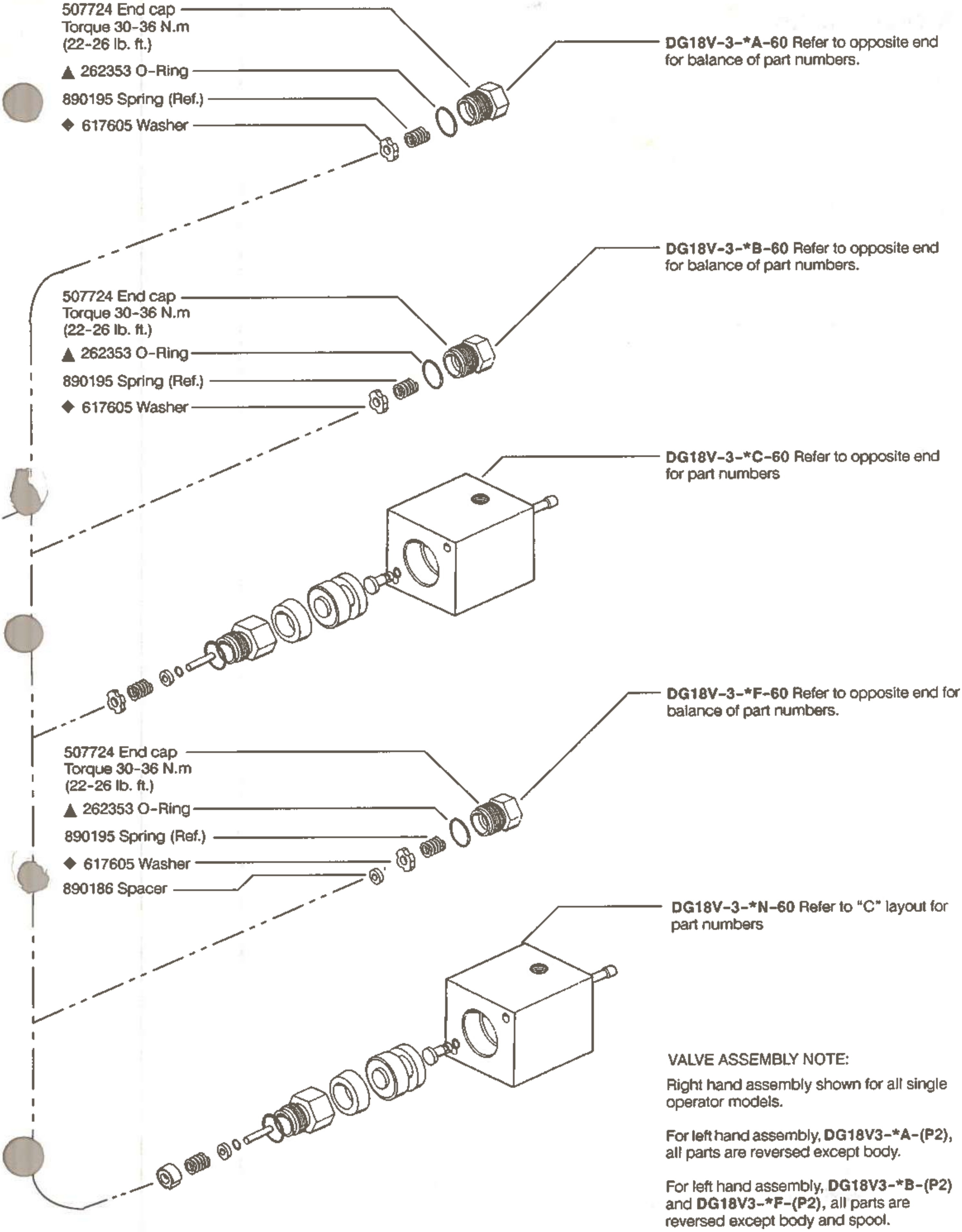
***** " V" Option, operator "A" is at port "A" end of valve and/or operator "B" is at port "B" end of valve, independent of spool type. Type 8 spool valves will always have a "V" present in model code.



▲ Included in seal kit 697382
☐ Included in (P2) manual operator kit 697384
◆ Assemble rounded face of washer towards spool

NOTE:

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. OFP, OFR, and OFRS series filters are recommended.



VALVE ASSEMBLY NOTE:

Right hand assembly shown for all single operator models.

For left hand assembly, **DG18V3-*A-(P2)**, all parts are reversed except body.

For left hand assembly, **DG18V3-*B-(P2)** and **DG18V3-*F-(P2)**, all parts are reversed except body and spool.

Model Code

D G 18 V –3– * * (L) – (P2) – (V) –* – 60

1 2 3 4 5 6 7 8 9 10 11

1 Directional control valve, subplate mounted

2 Air pilot operated

3 Rated pressure

350 bar (5000 psi)

4 Interface

ISO 4401-03 (CETOP 3, NFPA D03)

5 Spool type (Center condition)

0 – Open center (All ports)
1 – Open center (P & A to T)
2 – Closed center (All ports)
3 – Closed center (P & B)
6 – Closed center (P only)
7 – Open center (T blocked)
8 – Tandem center (P to T)
11 – Open center (P & B to T)
22 – Closed center (Two-way)
31 – Closed center (P & A)
33 – Closed center (Bleed A & B)

6 Spool spring arrangement

A – Spring offset to CLY. A, (Single operator)
B – Spring centered, (Single operator)
C – Spring centered (Dual operator)
F – Spring offset, to CLY. A, shift to center (Single operator)
N – No-spring, detented

7 Build type

L – Left hand build (Single operator only)
Blank – Standard right hand build (Single operator only)

8 Manual override option

P2 – Manual operator in end cap, (single operators) (Applicable for A(L), B(L) & F(L) models only)
Blank – Overrides in operator end only

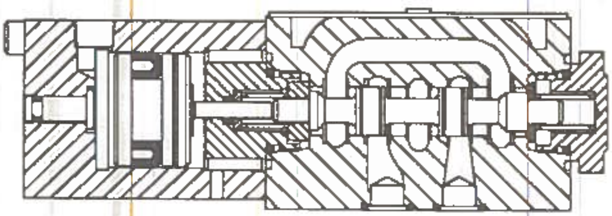
9 Actuator identity

V – Actuator identifier included for all type 8 spools (Refer to spool assembly note *****)

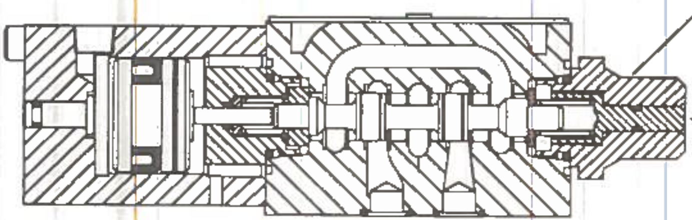
10 Thread connection type

P – 1/8" NPT threads
B – 1/8 BSP threads

11 Design number

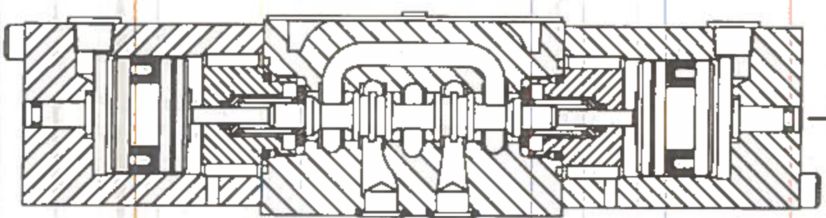


DG18V-3-*A-*-60 Typical spring offset valve / single operator



☐ 507971 Plug & pin S/A
Torque 30-36 N.m (22-26 lb. ft.)

DG18V-3--P2-*-60** With manual operator in end cap / single operator



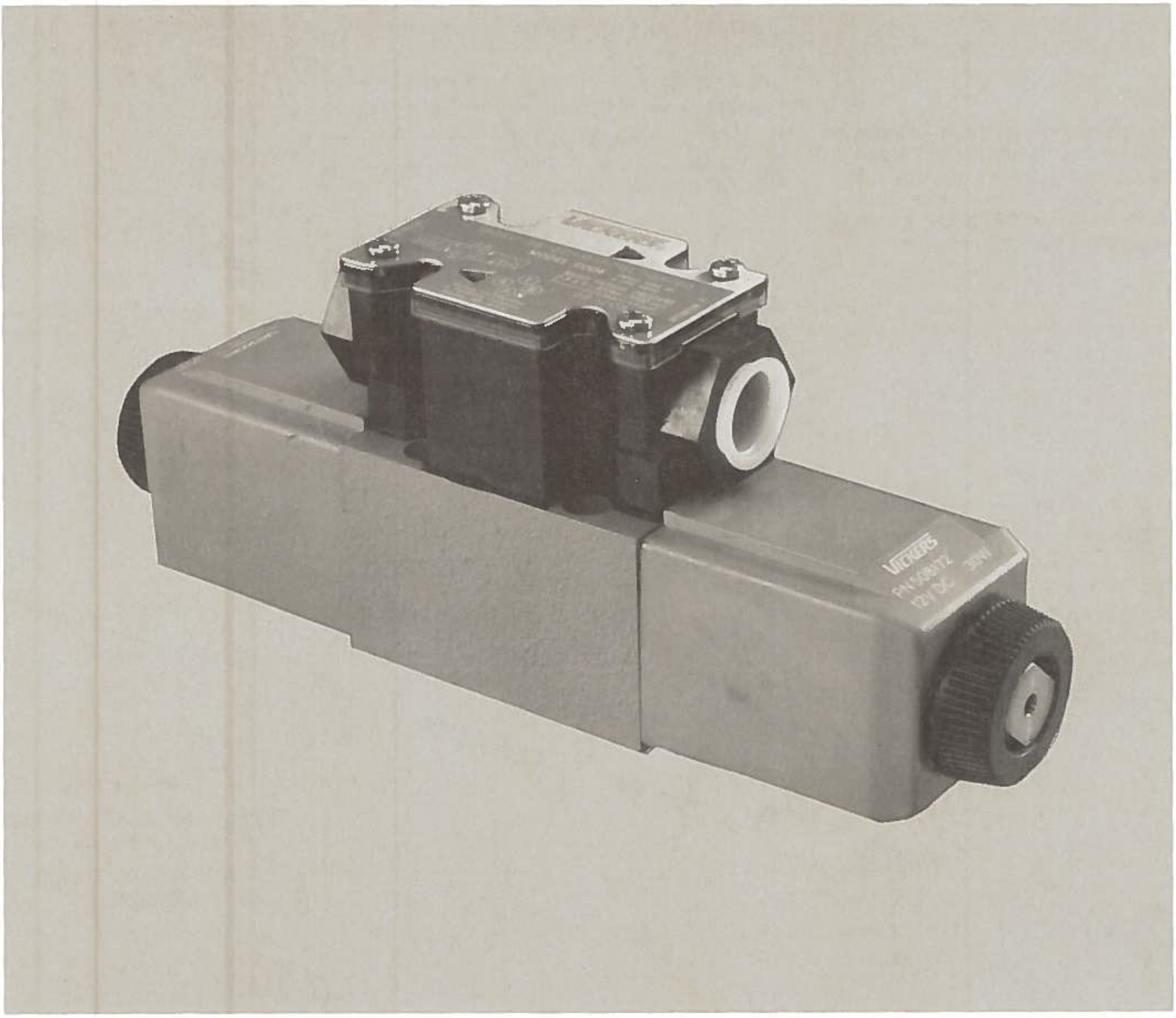
DG18V-3-*C-*-60 Typical spring centered valve / dual operator

Service Data

VICKERS

Cetop 3 Size Proportional Directional Control Valves

KD/TG4V-3S-*B/C/F(L)-**-*-(V)M-***(I)-*5-60-(EN**)



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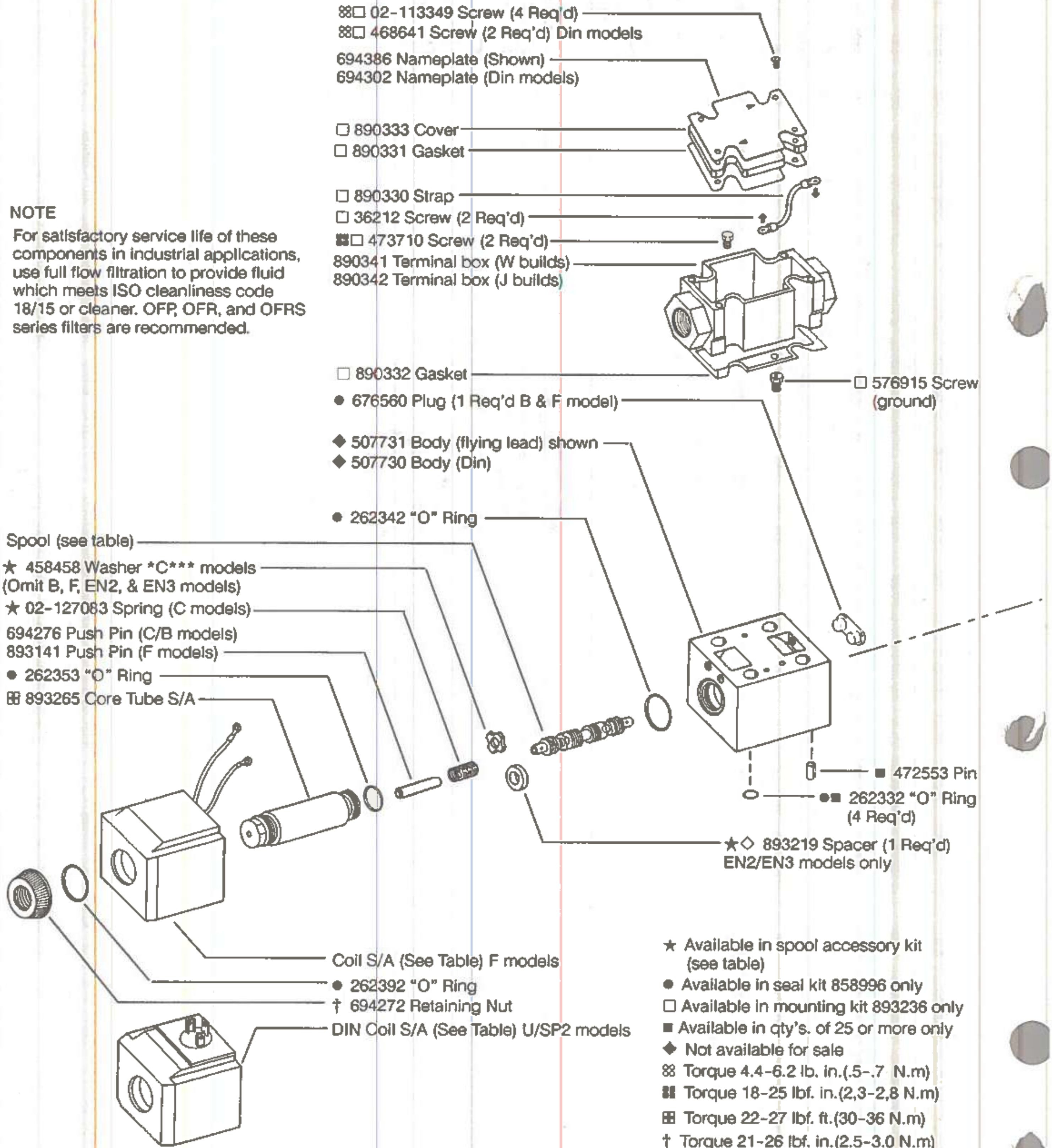
I-3897-S

COIL-LETTER	COIL S/A F MODELS	COIL S/A U MODELS	COIL S/A SP2 MODELS
G	02-134567	02-134569	————
GP	508172	507847	02-111166
H	02-134568	02-134570	————
HA	508173	507848	02-111168

NOTE

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. OFP, OFR, and OFRS series filters are recommended.



★ Available in spool accessory kit (see table)
● Available in seal kit 858996 only
□ Available in mounting kit 893236 only
■ Available in qty's. of 25 or more only
◆ Not available for sale
⌘ Torque 4.4-6.2 lb. in.(.5-.7 N.m)
■ Torque 18-25 lbf. in.(2,3-2,8 N.m)
⊞ Torque 22-27 lbf. ft.(30-36 N.m)
† Torque 21-26 lbf. in.(2.5-3.0 N.m)

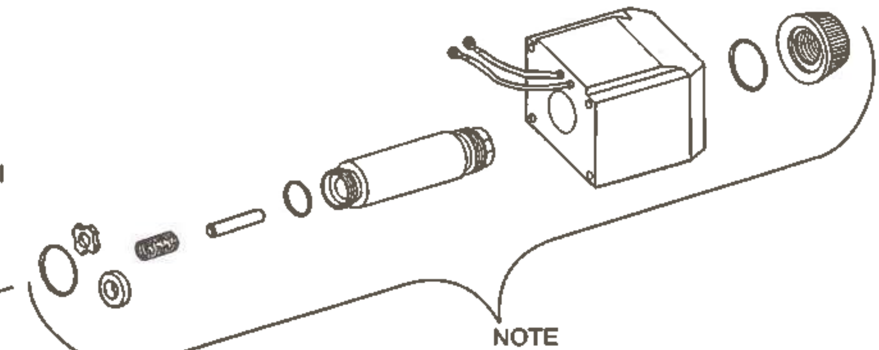
NOTE
See service drawing I-3886-S for options not shown.

⊞ 507908 End cap
● 262353 "O" Ring
★ 02-134574 Spring (1 Req'd)
★ 458458 Washer

NOTE
KTG4V-3S-*B(L)-(V)M-FW-60**
Spring Centered, Sol. "A" Removed
Refer to other end of valve for common part numbers except as noted.

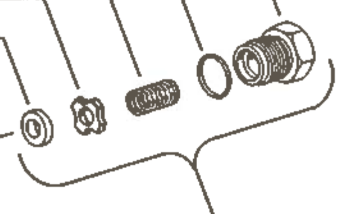
SPOOL NOTES
☆ Assemble type 2C15S-EN4 spool with long land over "A" port.
◇ Assemble spacer 893219 on "A" port end for 3C15N-EN2 spool and on "B" port end for 131C15N-EN3 spool.
Assemble spool with notched land over "A" port for both EN2 and EN3 models.
♠ Assemble spool with long land over "B" port.
⁂ Assemble spool with long land over "A" port.

NOTE
Right hand assembly shown for all single solenoid valves, for left hand assembly all parts are reversed except body.



NOTE
KDG4V-3S-*C*N-(V)M-FW-60-(EN2/3)
KDG4V-3S-*C-(V)M-FW-60-(EN4)**
Spring Centered, Dual Solenoid
Refer to other end of valve for common part numbers except as noted.

⊞ 507908 End cap
● 262353 "O" Ring
★ 02-134574 Spring (1 Req'd)
★ 458458 Washer
★ 893142 Spacer



NOTE
KTG4V-3S-*F(L)-(V)M-FW-60**
Spring offset to CYL. "A", shift to center
Refer to other end of valve for common part numbers except as noted.

MODEL	SPOOL	TYPE	SPOOL ACCESSORY KIT
-*C***	893131	2C19S	697373
	893132	2C19N	
	893127	2C08S	
	893128	2C08N	
	893129	2C15S	
	893130	2C15N	
	893138	33C08A	
	893139	33C15A	
	893220	33C22A	
	893134	☆ 2C15S-EN4	
	893133	◇ 3C15N-EN2	697376
	893133	◇ 131C15N-EN3	
-*B**N	893137	♠ 2*19N	697374
	893136	♠ 2*08N	
	893221	♠ 2*15N	
-*F**N	893137	⁂ 2*19N	697375
	893136	⁂ 2*08N	
	893221	⁂ 2*15N	

Model Code

K*G4V–3 S –* * (L) – * * – * (V) M – * * * (I) –* 5 – 60 – (EN**)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

1 **K – Proportional**
D – Directional control valve
T – Throttle valve
G – Subplate mounted
4 – Solenoid operated
V – 350 Bar (5075 psi) P, A, & B ports

2 **Interface**

3 – ISO-4401-03 CETOP 3 (NFPA D03)

3 **Standard performance**

S – Standard performance

4 **Spool type** (see table)

5 **Spool/Spring arrangement**

B – Spring centered, sol. A removed
C – Spring centered, dual solenoid
F – Spring offset to cyl. A, shift to center

6 **Build type**

L – Left hand build single solenoid models only
Blank – Standard right hand build

7 **Spool flow rating**
(@ 10 bar (145 psi) pressure drop

08 – 8 L/min. (2 USgpm)
15 – 15 L/min. (4 USgpm)
19 – 19 L/min. (5 USgpm)

8 **Metering condition**

S – Meter-out (only)
A – Meter-in (only)
N – Meter-in and Meter-out

9 **Manual override options**

Blank – Plain override solenoid ends only
H – Waterproof override solenoid end only
P2 – Plain override both ends of single solenoid models

10 **Solenoid Identification**
(models with EN2, EN3 or EN4 require V in model code for reverse solenoid identification)

11 **Flag**

Electrical options & features (refer to service drawing I-3886-S)

12 **Coil type**

F – Flying lead
U – DIN 43650
SP1 – Single 6.3 mm series spade to IEC 760 (Direct D.C. models only)
SP2 – Dual 6.3 mm series spade to IEC 760 (Direct D.C. models only)

13 **Electrical connections** (F type coil only) omit if not required

T – Wired terminal block
PA – Instaplug male receptacle only
PB – Instaplug male & female receptacle
PA3 – Three pin connector
PA5 – Five pin connector

14 **Housing (F type coils only)**

W – 1/2 NPT thread wiring housing
J – 20 mm thread wiring housing

15 **Electrical Options**
(omit when not required)

I – ISO 4400 with fitted plug (U models only)

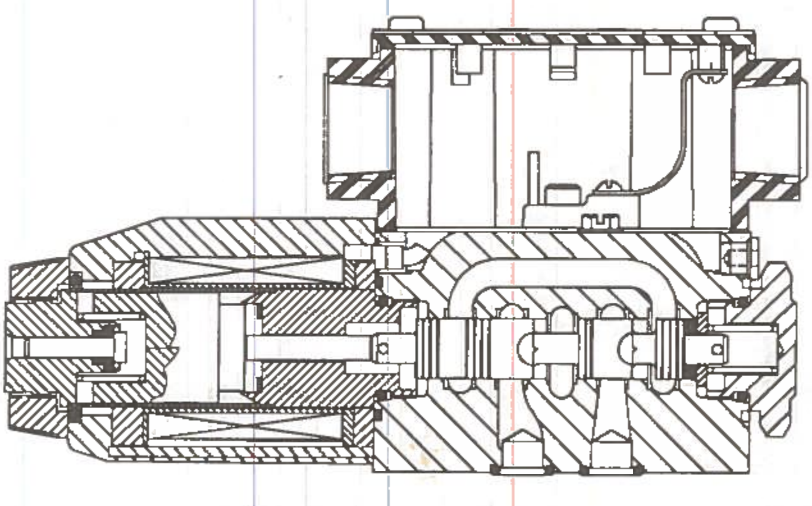
16 **Coil indentification letter**
(see table)

17 **Tank pressure rating**

5 – 100 Bar (1450 psi)

18 **Design**

19 **Special modifications**
(omit if not required)



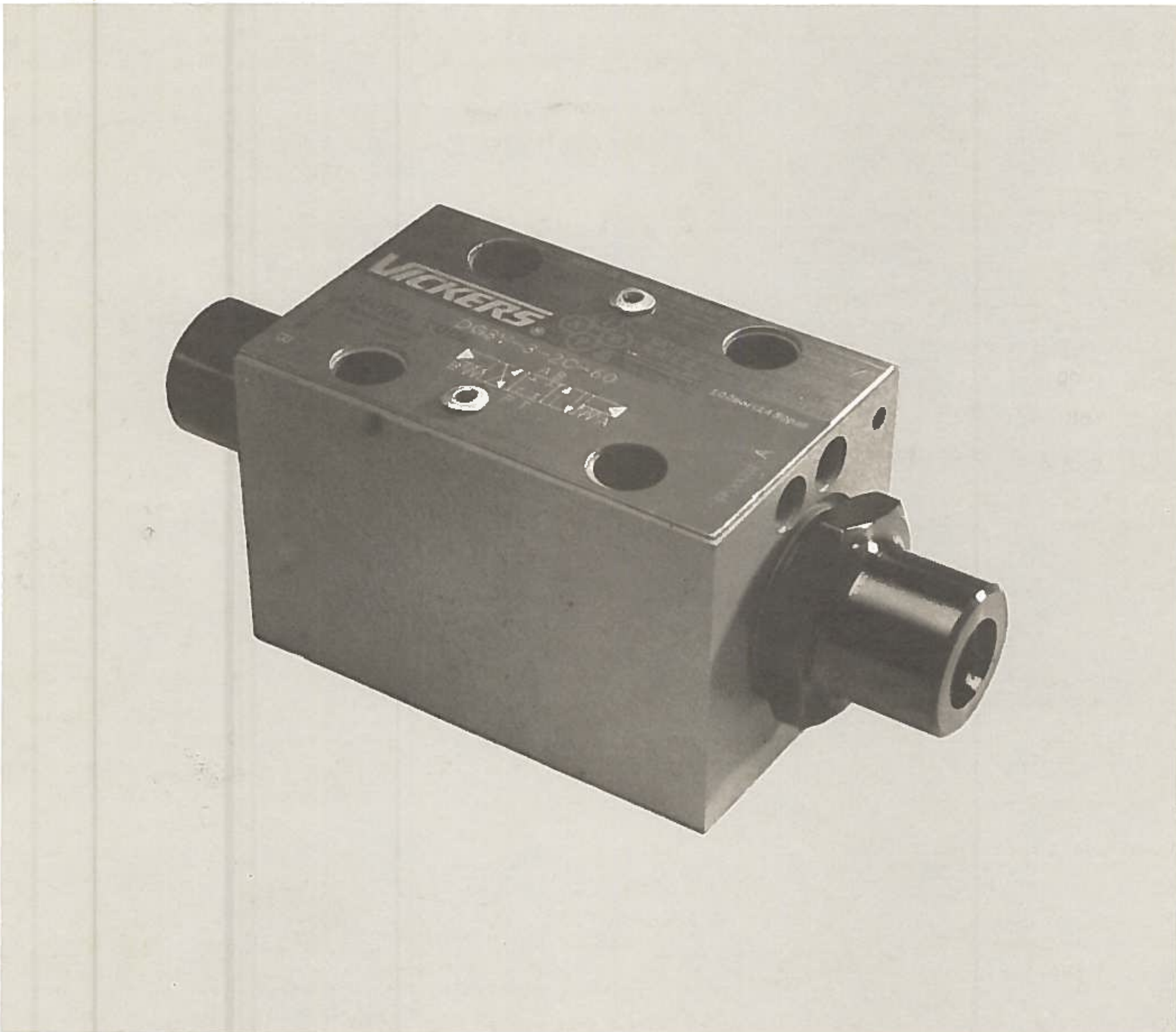
Typical sectional view, KTG4V-3S-*F(L)**-(V)M-FW-*5-60 spring offset valve.

Service Data

VICKERS

Hydraulically Operated Directional Control Valve

DG3V-3- ** *(L)-(T)-(P1)-7-*-60



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SPOOL/SPRING ARRANGEMENT	DRAIN TYPE	
	INTERNAL	EXTERNAL
	SPOOL NO.	SPOOL NO.
□ 0A	694537	694492
0B	694540	694435
0C	———	694435
0F	694540	———
0N	———	694494
□ 2A	694538	698839
2B	694541	698841
2C	———	698841
2F	694541	———
2N	———	698842
◆ 3B	694542	694436
◆ 3C	———	694436
◆ 3F	694542	———
□ 6A	694539	694493
6B	694543	694437
6C	———	694437
6F	694543	———
6N	———	694495
◇ 0	———	694492
◇ 2	———	698839
◇ 6	———	694493
33B	694544	694438
33C	———	694438
33F	694544	———

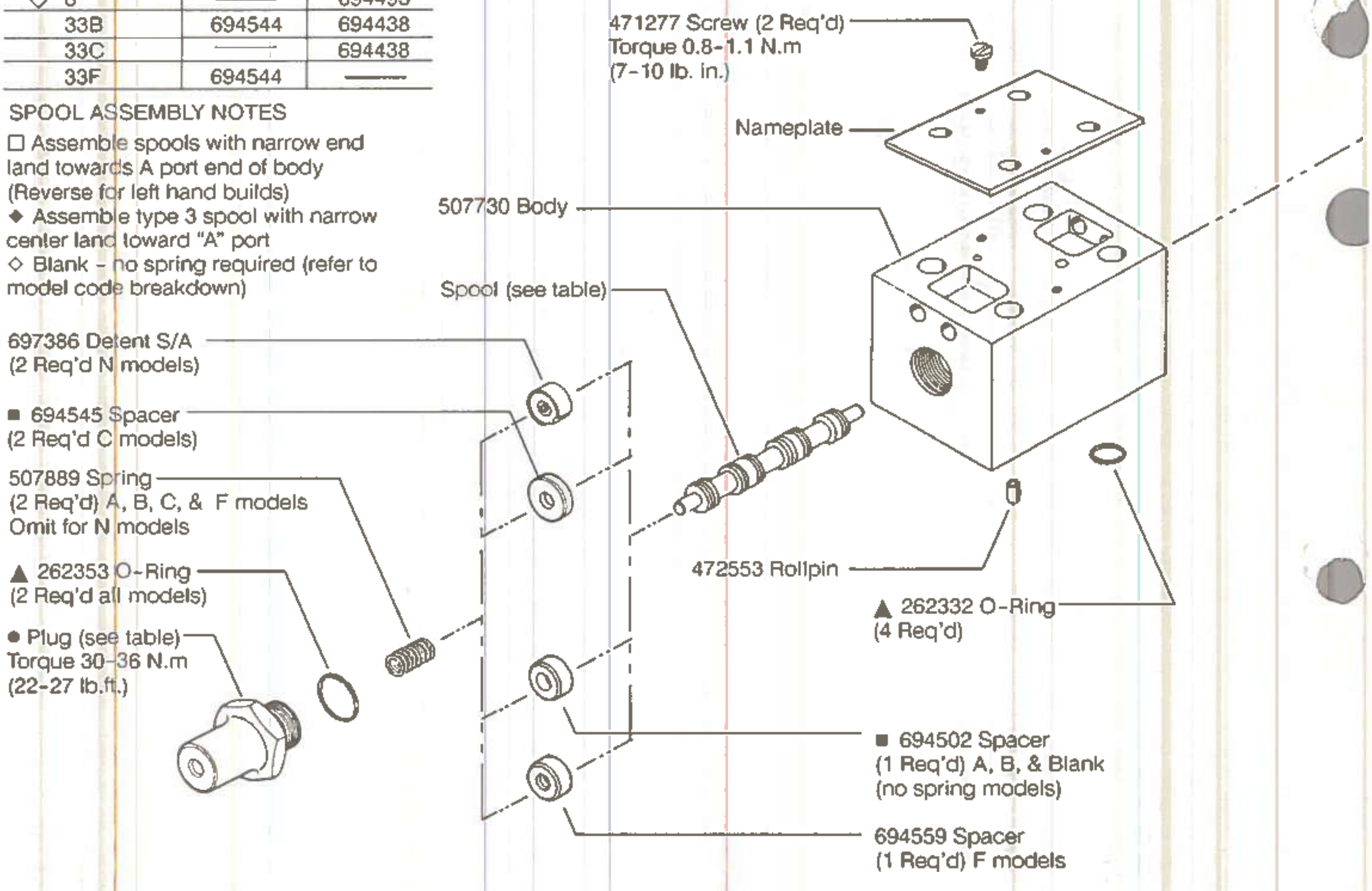
MODEL	● PLUG (qty.)
DG3V-3-**-7-B-60	694535 (2)
DG3V-3-**-7-S-60	694536 (2)
DG3V-3-**A-7-B-60	694535 (2)
DG3V-3-**A-7-S-60	694536 (2)
DG3V-3-**A-T-7-B-60	694535 (1)
DG3V-3-**A-T-7-S-60	694536 (1)
DG3V-3-**A-T-P1-7-B-60	694535 (1)
DG3V-3-**A-T-P1-7-S-60	694536 (1)
DG3V-3-**B-7-B-60	694536 (2)
DG3V-3-**B-7-S-60	694536 (2)
DG3V-3-**B-T-7-B-60	694535 (2)
DG3V-3-**B-T-7-S-60	694536 (2)
DG3V-3-**B-T-P1-7-B-60	694535 (1)
DG3V-3-**B-T-P1-7-S-60	694536 (1)
DG3V-3-**C-7-B-60	694535 (2)
DG3V-3-**C-7-S-60	694536 (2)
DG3V-3-**F-T-7-B-60	694535 (1)
DG3V-3-**F-T-7-S-60	694536 (1)
DG3V-3-**F-T-P1-7-B-60	694535 (1)
DG3V-3-**F-T-P1-7-S-60	694536 (1)
DG3V-3-**N-7-B-60	694505 (2)
DG3V-3-**N-7-S-60	694557 (2)

SPOOL ASSEMBLY NOTES

□ Assemble spools with narrow end land towards A port end of body (Reverse for left hand builds)

◆ Assemble type 3 spool with narrow center land toward "A" port

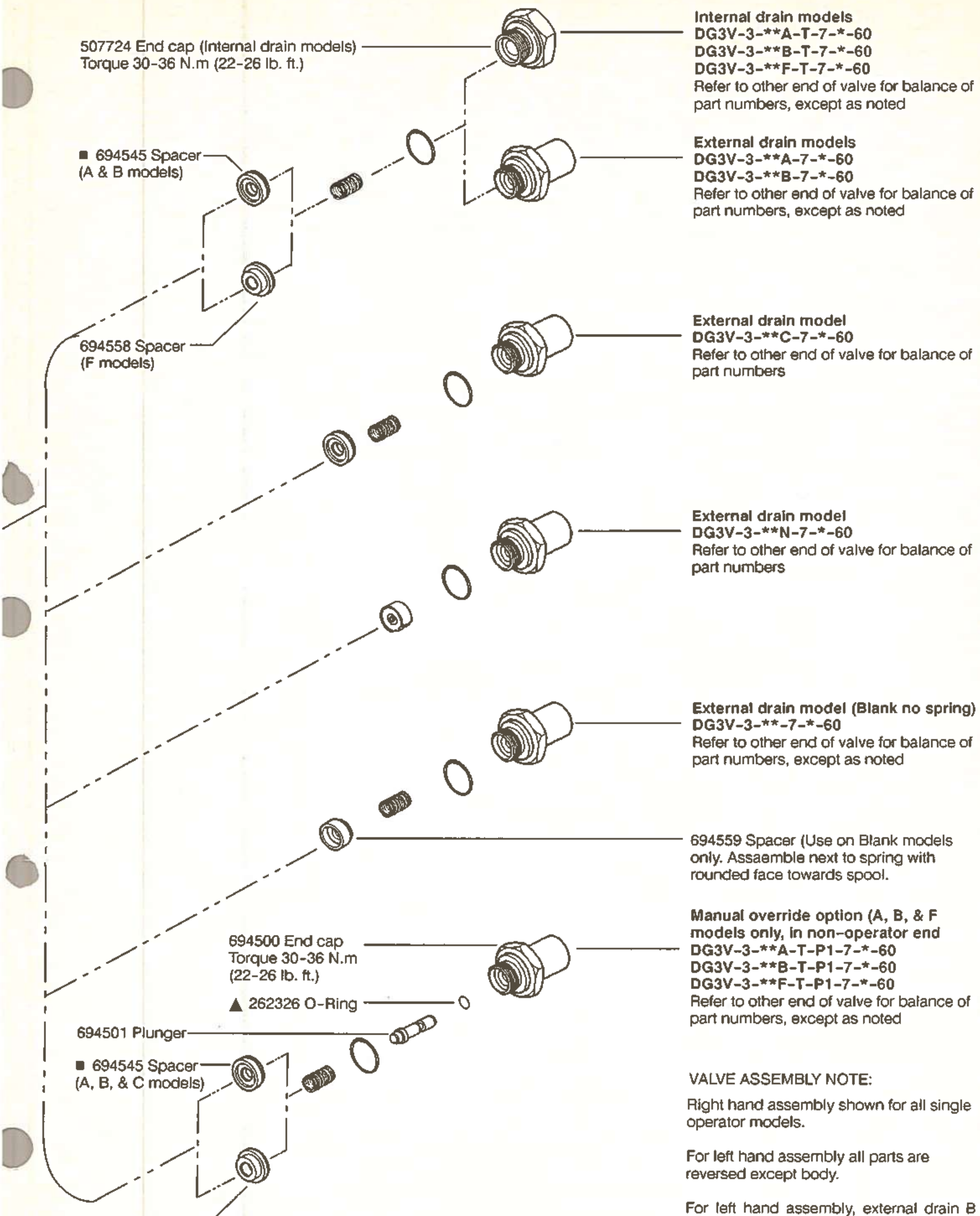
◇ Blank - no spring required (refer to model code breakdown)



NOTE:
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. OFP, OFR, and OFRS series filters are recommended.

▲ Available in seal kit 02-110959

■ Recessed side of spacer to mate with spool end land



VALVE ASSEMBLY NOTE:

Right hand assembly shown for all single operator models.

For left hand assembly all parts are reversed except body.

For left hand assembly, external drain B models all parts are reversed except body and spool.

Model Code

D G 3 V –3– ** * (L) – (T) – (P1) – 7 –* – 60

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13]

[1] **Directional control valve**

[2] **Subplate/Manifold mounted**

[3] **Hydraulically operated**

[4] **Rated pressure**

V – 350 bar (5000 psi) on P, A & B Ports

[5] **Interface ISO 4401-AB-03-4-B**

3 – NFPA D01, ISO 4401-03, Cetop 3 (with location pin)

[6] **Spool type**

0 – Open center (all ports) (all models)
2 – Closed center (all ports) (all models)
3 – Closed center (P & B ports) (B, C, F models only)
6 – Closed center (P port only) (all models)
33 – Closed center (bleed A & B ports) (B, C, F models only)

[7] **Spool/Spring arrangement**

Blank – No spring
A – Spring offset (Single operator)
B – Spring centered (Single operator)
C – Spring centered
F – Spring offset, shift to center
N – No-spring detented

[8] **Left hand build**

(Omit if not required)
L – Left hand build A, B & F models only

[9] **Internal drain**

(Omit if not required)
T – Internal drain, (required on F models available on A & B models)

[10] **Manual override**

(Omit if not required)
P1 – Manual override (A, B, & F models only in non-operator end) Internal drain only

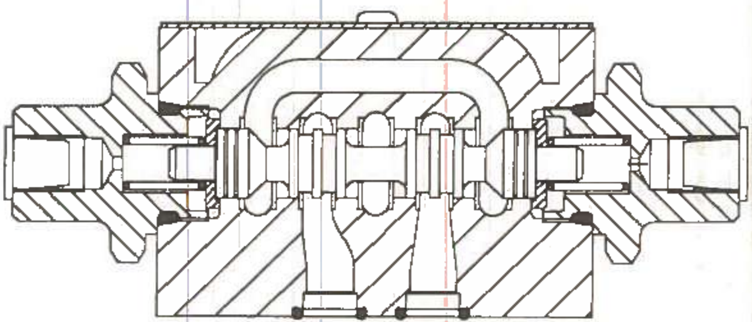
[11] **Tank pressure limit**

7 – 7 - 210 bar

[12] **Thread for pilot/drain connection**

B – G 1/8" threads
S – SAE internal straight thread

[13] **Design**



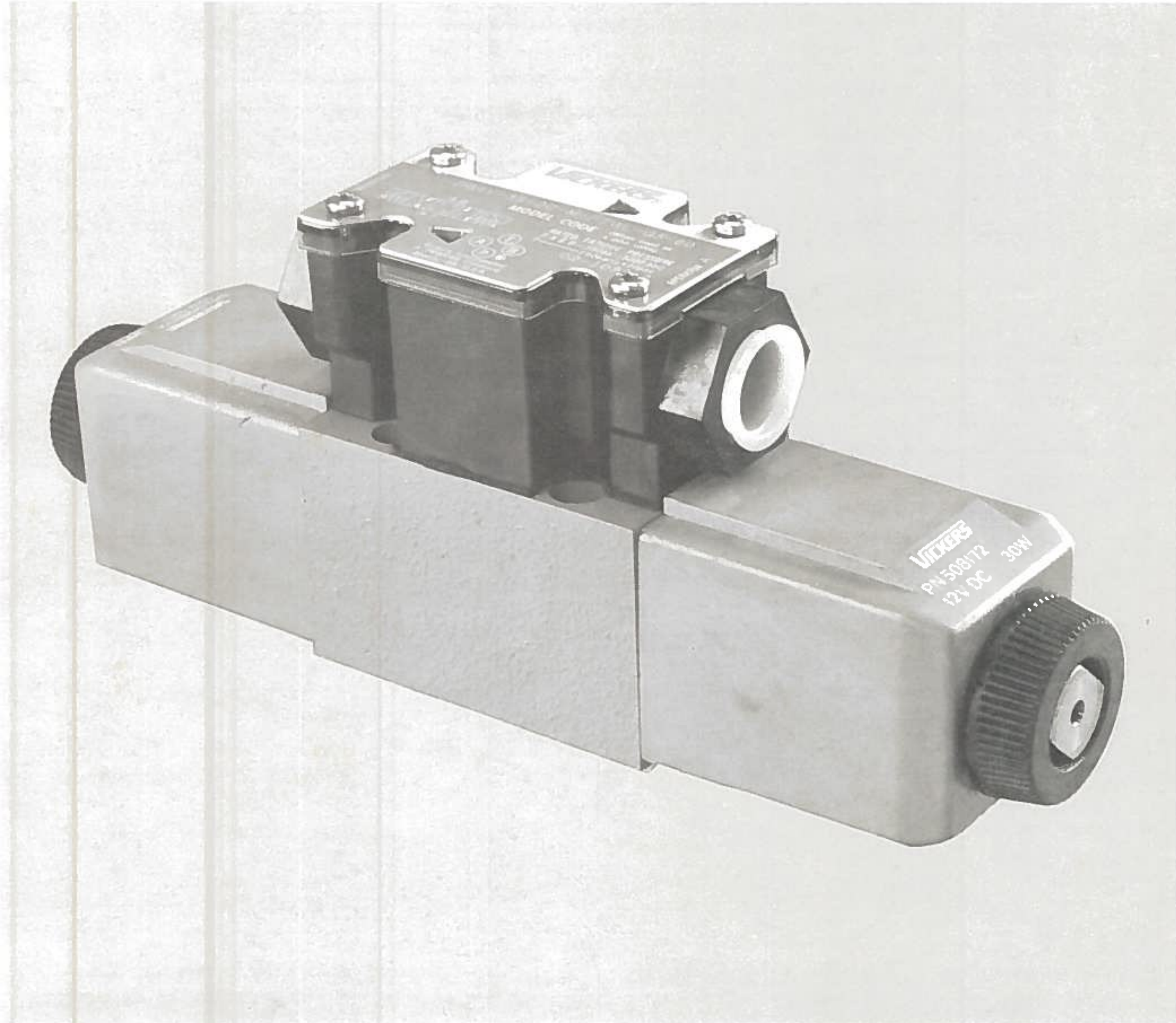
Sectional view, spring centered valve

Service Data

VICKERS

CETOP 3 Size Soft Shift Directional Control Valves

DG4V-3S-***2**(L)-**-(V)M-******(L)-**5-60-(P**-A**-B**-T**)



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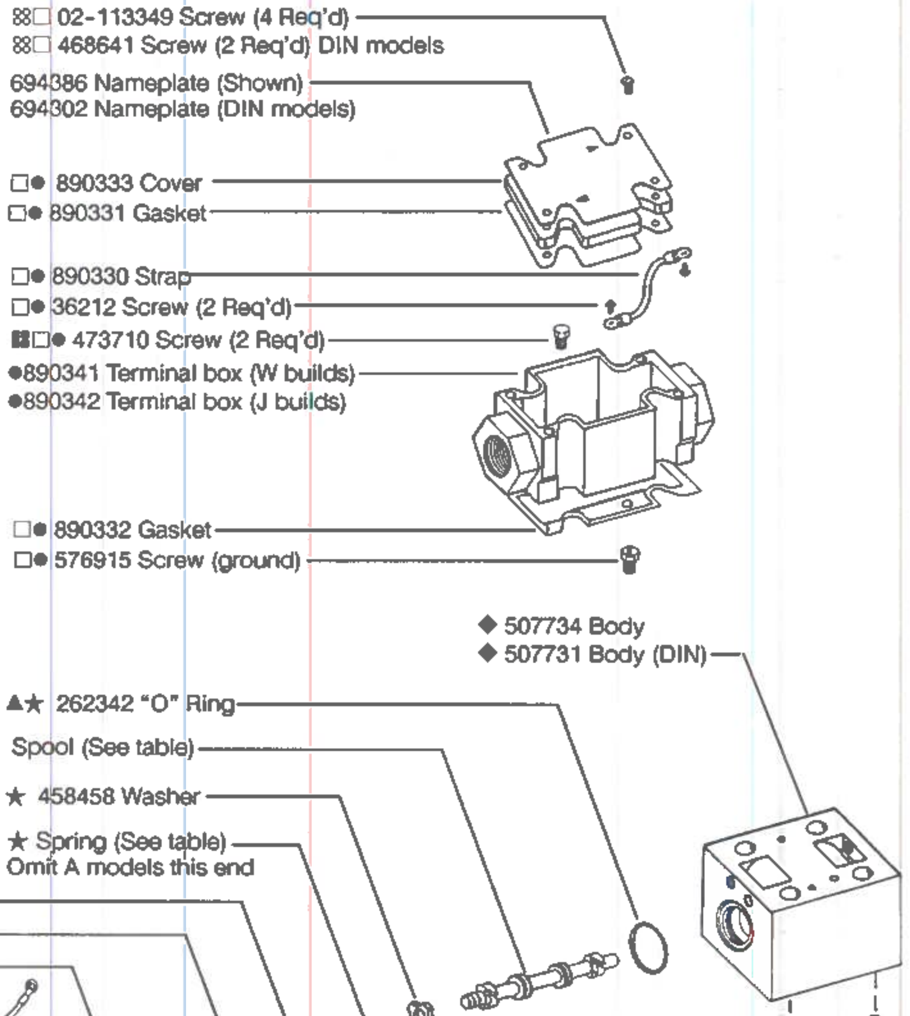
MODEL	SPOOL	TYPE	SPRING	★ ACCESSORY KIT
-**B/C	892913	2*	507889	697365
	892914	6*	694299	697366
	893319	8*	694299	697366
	892915	33*2	507889	697365
-**A	892916	2A	507889	697365

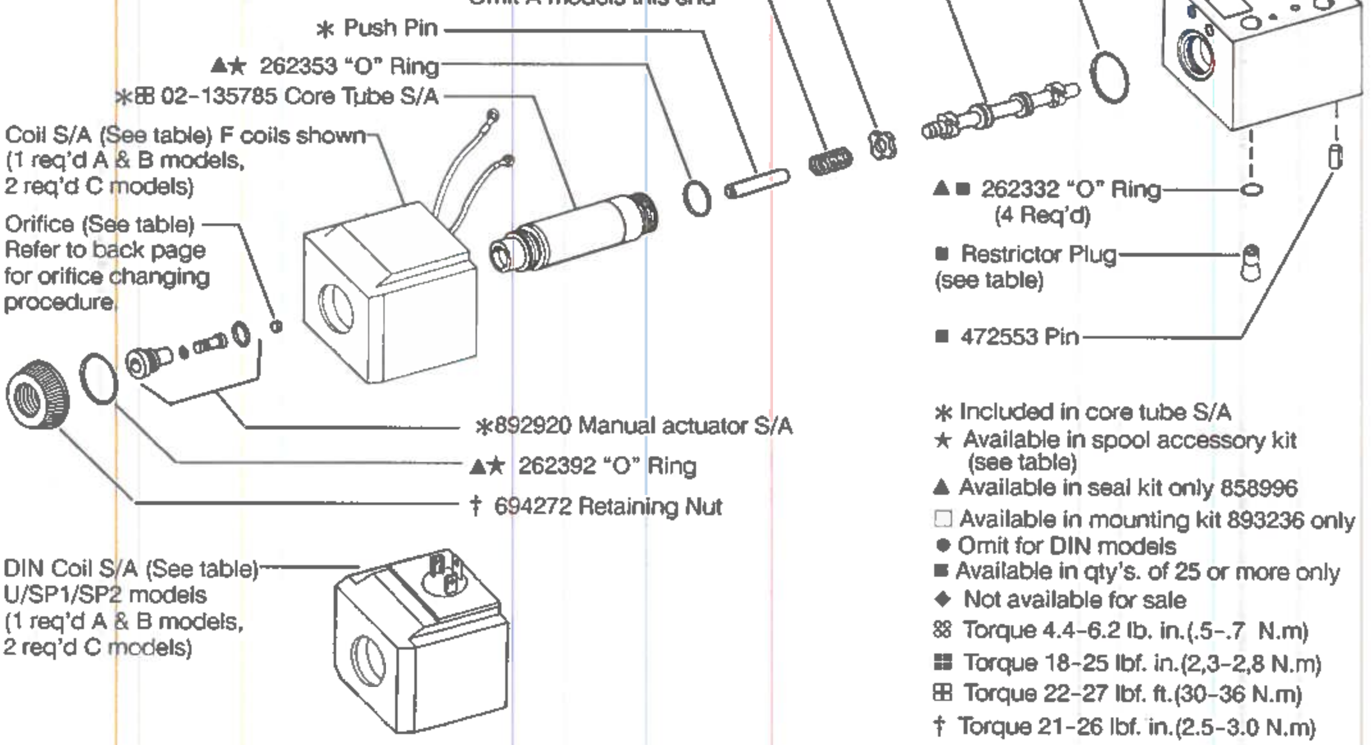
RESTRICTOR PLUG
Install In P,T,A, Or B As Required

CODE	ORIFICE DIA.	PART #
03	0,30 (0.012)	694341
06	0,60 (0.024)	694342
08	0,80 (0.030)	694343
10	1,00 (0.040)	694344
13	1,30 (0.050)	694345
15	1,50 (0.060)	694346
20	2,00 (0.080)	694347
23	2,30 (0.090)	694348

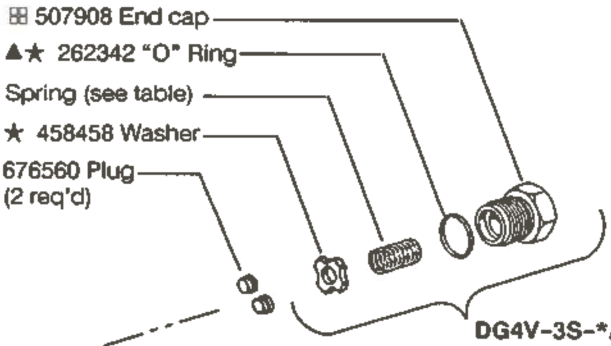
ORIFICE (1 req'd per core tube)

CODE	PART #	COLOR
00	Orifice omitted	
07	635134	Green
08	635135	Blue
09	893320	Purple



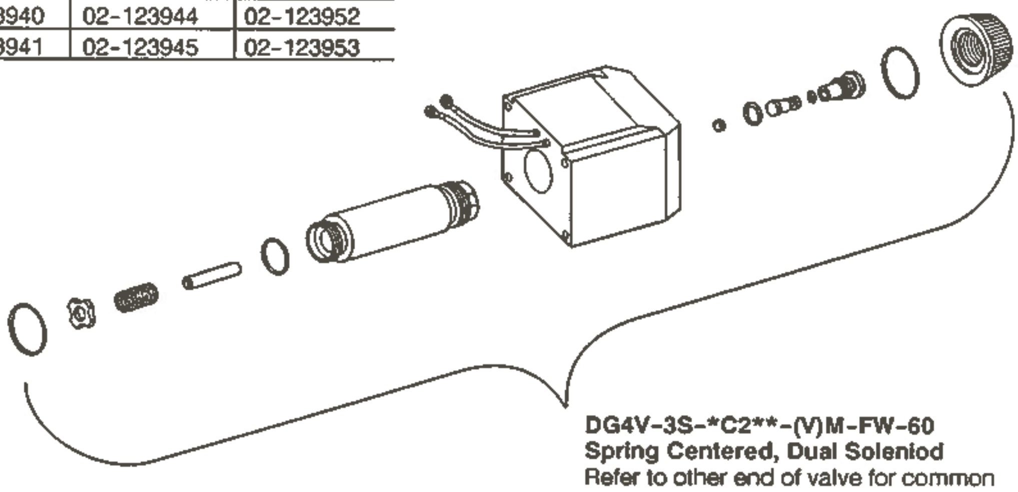


NOTE
See service drawing I-3886-S for options.

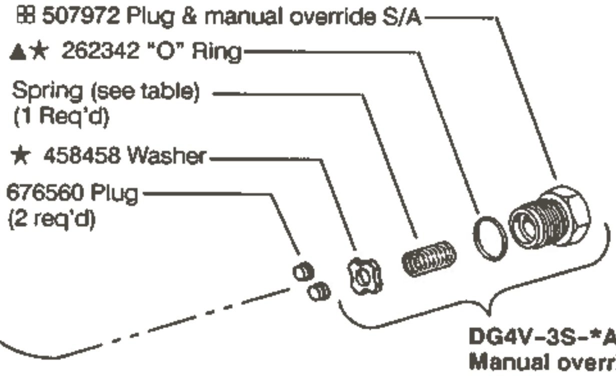


DG4V-3S-*A2(L)**-(V)M-FW-60**
Spring offset to CYL. "A", shift to center
DG4V-3S-*B2(L)**-(V)M-FW-60**
Spring Centered, Sol. "A" Removed
Refer to other end of valve for common part numbers except as noted.

COIL-LETTER	COIL S/A F MODELS	COIL S/A U MODELS	COIL S/A SP2 MODELS	COIL S/A SP1 MODELS
GH	02-123958	02-123938	02-123942	02-123950
HH	02-123959	02-123939	02-123943	02-123951
DJH	02-123960	02-123940	02-123944	02-123952
PH	02-123961	02-123941	02-123945	02-123953



DG4V-3S-*C2-(V)M-FW-60**
Spring Centered, Dual Soleniod
Refer to other end of valve for common part numbers except as noted.



DG4V-3S-*A2-*P2-(L)**-(V)M-FW-60**
Manual override in end cap
Refer to other end of valve for common part numbers except as noted.

NOTE
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. OFP, OFR, and OFRS series filters are recommended.

NOTE
Right hand assembly shown for all single solenoid valves, for left hand assembly all parts are reversed except body.

Model code

DG4V – 3 S – * *(L) 2 ** – * – (V) M – * * * * (L) – * H 5 – 60 – (P*–A*–B*–T*)

[1] DG4V, [2] 3, [3] S, [4] *, [5] *(L), [6] 2, [7] **, [8] *, [9] (V), [10] M, [11] *, [12] *, [13] *, [14] *, [15] (L), [16] *, [17] H, [18] 5, [19] 60, [20] (P*–A*–B*–T*)

1 Valve type

D – Directional control valve
G – Subplate mounted
4 – Solenoid operated
V – Rated pressure (350 bar)

2 Interface

3 – ISO 4401-03, CETOP 3 (NFPA D03)

3 Standard performance

4 Spool types

2 – Closed center (all ports)
6 – Closed center (P only)
8 – Tandem center (open crossover)
33 – Closed center (Bleed A & B)

5 Spool/spring arrangement

A – Spring offset, single solenoid
AL – Spring offset, single solenoid (Left hand build)
B – Spring centered, single solenoid
BL – Spring centered, single solenoid (Left hand build)
C – Spring centered

6 Soft shift valve

7 Soft shift orifice size

00 – No orifice
07 – .7 mm
08 – .8 mm
09 – .9 mm

8 Manual override

Blank – Override in solenoid end only
P2 – Manual override in end cap and solenoid, A & B models only

9 Solenoid energization identity

Blank – ANSI B93 energize solenoid A to give flow P to A
V – Solenoid identification determined by position of solenoid (i.e. solenoid A is at port A end of valve, Solenoid B is at port B end of valve.)

10 Flag symbol

(Introduces electrical features and options)

11 Coil types

F – Flying lead type coils
U – DIN 43650 coils
SP1 – Single $^1/_4$" male spade ISAE J858A type 1A
SP2 – Dual $^1/_4$" male spade ISAE J858A type 1A

12 Coil connectors

("U" type coils only, omit if not required)

1 – Connector fitted
6 – Connector with lights fitted
11 – Rectifier with lights fitted
12 – Rectifier fitted

13 Electrical connections

("F" type coils only, omit if not required)

PA – Insta-plug male recpt. only
PA3 – 3 pin receptacle
PA5 – 5 pin receptacle
PB – Insta-plug male & female recpt.
T – Terminal block

14 Wiring housing thread

("F" type coils only, omit if not required)
W – 1/2 NPT
J – M20 x 1.5

15 Solenoid indicator lights

(Not available on PA, U, SP1, SP2, omit if not required)

16 Coil identification letter

G – 12V DC DJ – 98V DC
H – 24V DC P – 110V DC

17 Soft shift coil identification

18 Tank pressure rating

5 – 100 bar (1450 psi)

19 Design number

20 Port orifices

e.g. "P08" – 0.8 mm orifice in P port (omit it not required)

03 – 0.30 dia. 13 – 1.3 dia.
06 – 0.60 dia. 15 – 1.5 dia.
08 – 0.80 dia. 20 – 2.0 dia.
10 – 1.0 dia. 23 – 2.3 dia.

Orifice changing procedure

WARNING

1. Before breaking a circuit connection make certain that power is off and system pressure has been released. Lower all vertical cylinders, discharge accumulators and block any load whose movement could generate pressure. Plug all removed units and cap all lines to prevent entry of dirt into the system.

2. Using a 5/32" hex key, remove manual actuator plug and spring from the end of solenoid (Tightening torque 6.2–7.3 N.m 55–65 lbf.in.)

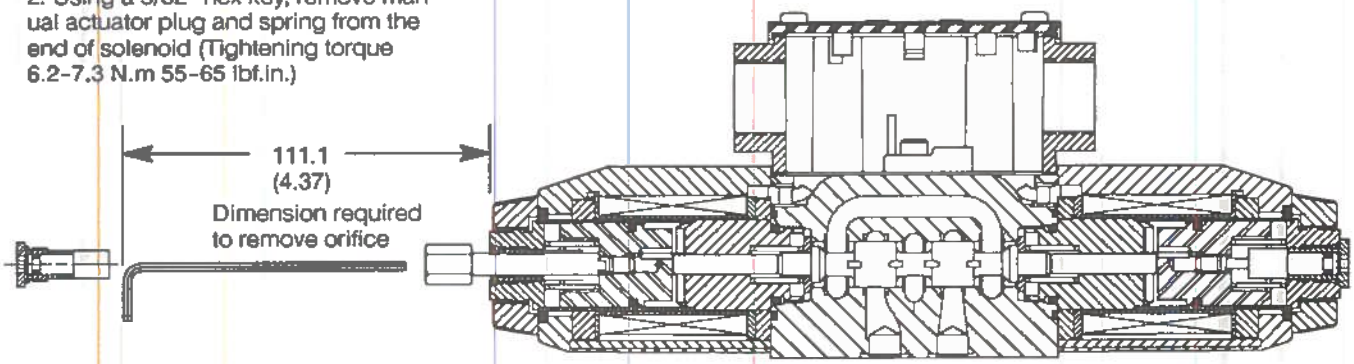
3. Insert extraction tool (878495) into solenoid via the manual actuator opening. Rotate tool until aligned and push pin into slot in armature.

4. Using 1/2" wrench and tool to prevent the armature from rotating, insert 3/32" hex key down the center of tool and remove orifice plug.

5. Replace by the same method, tightening orifice snug to ensure bottoming of threads. Smaller orifices increase response times, larger orifices decrease response time.

Orifice & tool kit 02–140211

For fine tuning shift performance, orifice must be ordered separately. The kit includes (2) each of .7, .8 & .9 mm dia. orifices, (1) installation tool, (1) 5/32" hex key and (1) 3/32" hex key.

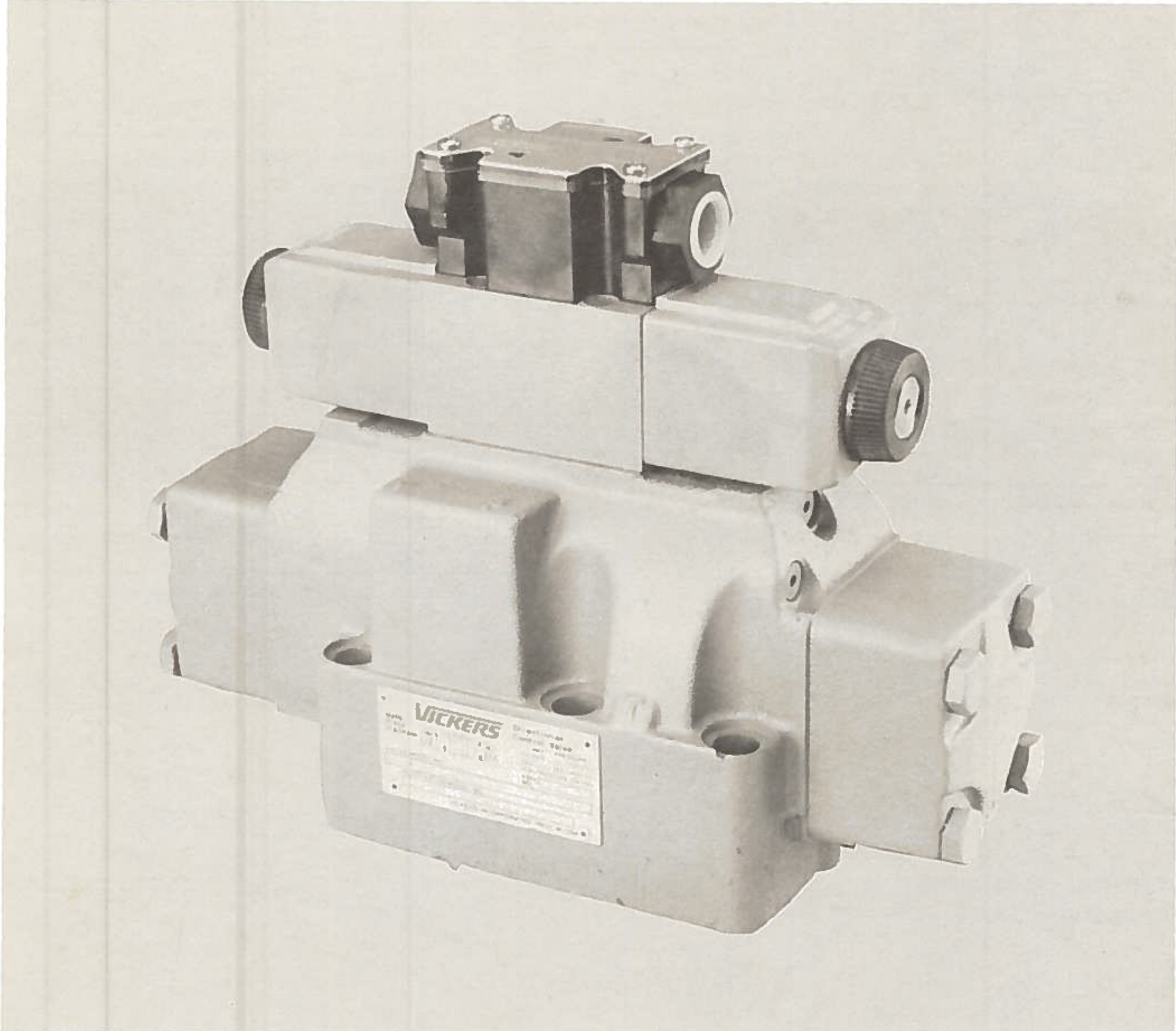


Service Data

VICKERS

Solenoid Controlled Pilot Operated Directional Valve

DG5S-H8-(L)-(*)(X)-(*)-(E)-(T)(*)-(V)M-(S*)-*(**)**(L)-***-***-60/70**



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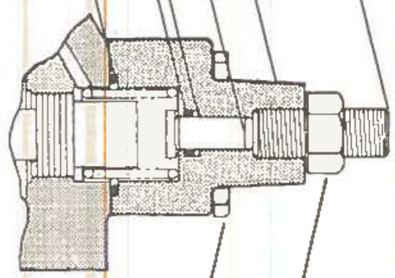
Released 05-01-91

I-3889-S

Parts shown included in stroke ADJ. kit 941156. Order two kits if stroke ADJ. is required both ends.



MAIN STAGE SPOOL TYPE	AVAILABLE VALVE TYPE	SPOOL	MAIN STAGE ID PLATE "A" ONLY	MAIN STAGE ID PLATE B/C/F/N
O	A/B/C//N	786350	400975	400976
1		*786557		400977
2		786349		400978
3		*786558		400979
4		628162		400980
6		786559		400981
8		627221		400980
9		786561		400976
11		*786557		632700
31		*786558		580475
33		786562		400981

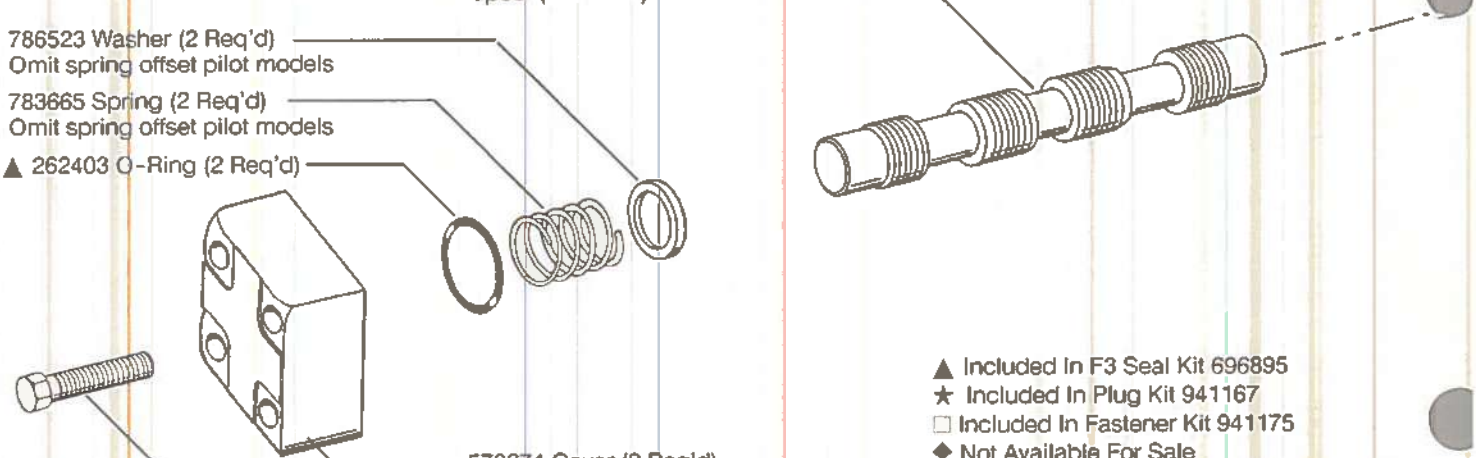
* SPOOL ASSEMBLY NOTE

Assemble type 1 & 3 spools with narrow center land toward "A" end of valve. "A" end is defined as being closest to CYL. port "A". Type 11 & 31 spools are installed in reverse of type 1 & 3 with narrow center lands toward "B" end of valve.

VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE
DG5S-H8-*A-60	O, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3S-2A-60
DG5S-H8-*A-70		DG4V-3-2A-60
DG5S-H8-*A-60	4 & 8	DG4V-3S-28A-60
DG5S-H8-*A-70		DG4V-3-28A-60
DG5S-H8-*B-60	O, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3S-6B-60
DG5S-H8-*B-70		DG4V-3-6B-60
DG5S-H8-*B-60	4 & 8	DG4V-3S-68B-60
DG5S-H8-*B-70		DG4V-3-68B-60
DG5S-H8-*C-60	O, 1, 2, 3, 6, 9, 11, 31, 33, 52, 521	DG4V-3S-6C-60
DG5S-H8-*C-70		DG4V-3-6C-60
DG5S-H8-*C-60	4 & 8	DG4V-3S-68C-60
DG5S-H8-*C-70		DG4V-3-68C-60
DG5S-H8-*N-60	O, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3S-6N-60
DG5S-H8-*N-70		DG4V-3-6N-60
DG5S-H8-*N-60	4 & 8	DG4V-3S-68N-60
DG5S-H8-*N-70		DG4V-3-68N-60

See pilot valve service drawing for parts breakdown

■ PLUG	TORQUES (OILED) N.m.	TORQUES (OILED) lb. in.
113000 237588	5.0-5.9	45-52
343740	15.0-16.0	133-142
398071	9.8-10.2	87-90
407533	12.1-12.4	107-110



▲ Included In F3 Seal Kit 696895
★ Included In Plug Kit 941167
☐ Included In Fastener Kit 941175
◆ Not Available For Sale
♠ Used On Check Valve Models Only
■ Plug Torques (See Table)
● Available Only In Kit Of 25 Each

PILOT STAGE BOLT KIT (INCLUDES 4 ATTACHING BOLTS)	
MODEL	BOLT KIT
W/O Pilot choke	696892
W/ Pilot choke	696893

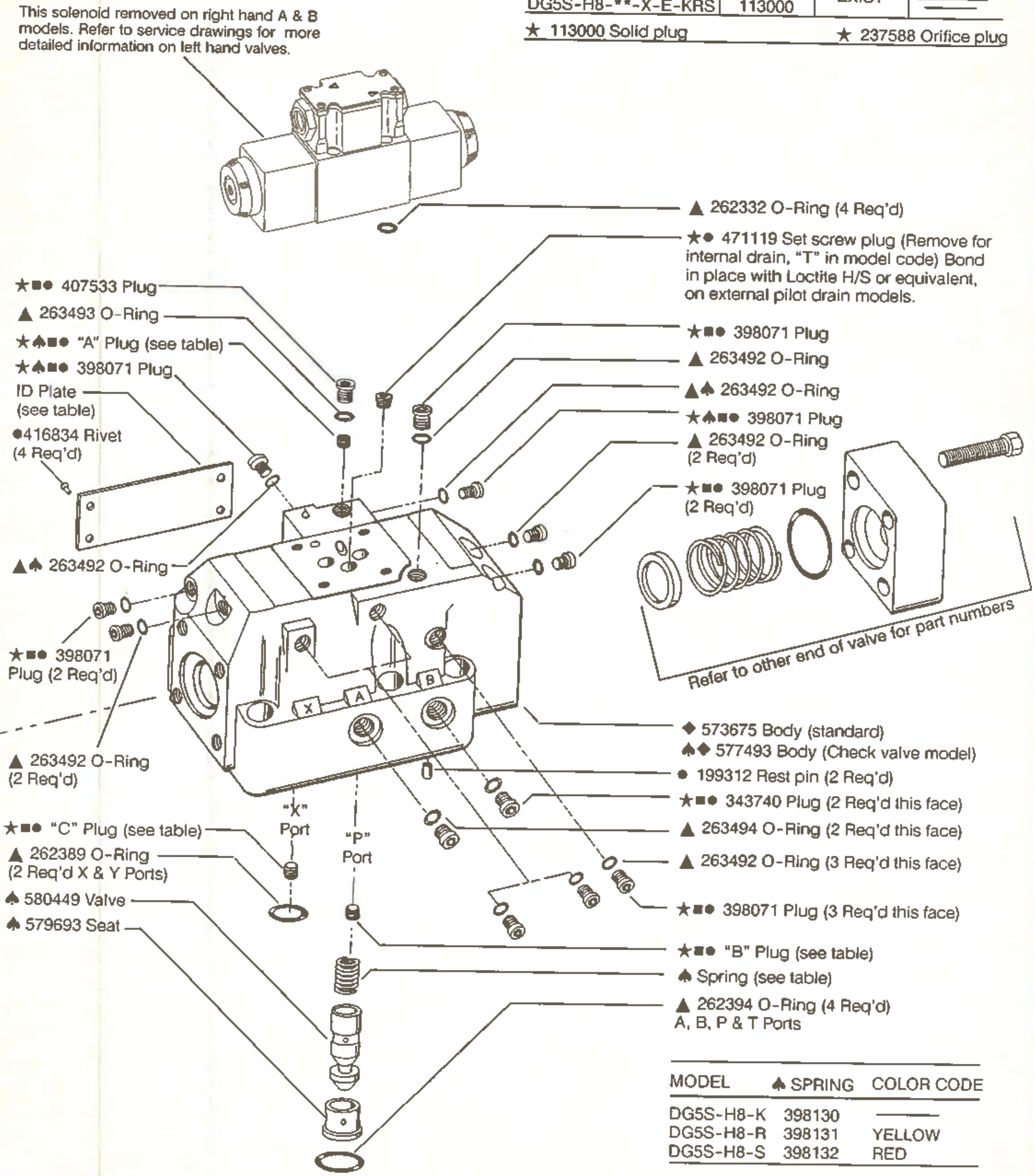
Torque 4.5-5.7 N. m. (39.8-50.4 lb. in.)

See pilot choke service drawing for parts breakdown

■ PLUG INSTALLATION TABLE

MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S-H8-**	DOES NOT EXIST	237588	———
DG5S-H8-**-E		113000	237588
DG5S-H8-**-X		———	———
DG5S-H8-**-X-E		113000	———
DG5S-H8-**-KRS	237588	DOES NOT EXIST	———
DG5S-H8-**-E-KRS	113000		237588
DG5S-H8-**-X-KRS	———		———
DG5S-H8-**-X-E-KRS	113000		———

★ 113000 Solid plug ★ 237588 Orifice plug



MODEL	♠ SPRING	COLOR CODE
DG5S-H8-K	398130	———
DG5S-H8-R	398131	YELLOW
DG5S-H8-S	398132	RED

Model Code

(F3)DG5S-H8-* * (L)(*)(X)(*)(E)-(T)(*)-(V)M-(S*)*(**) * * (L)-** 5-***-60/70

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

1 Seals for mineral oil & fire resistant fluids

2 Directional control valve
Manifold or subplate mounted
Solenoid controlled
Pilot operated
Rated pressure 310 Bar (4500 psi)

3 High flow interface

8 – NFPA-D06 (ISO-4401-08)

4 Spool type (see table)

5 Spool/Spring arrangement

A – Spring offset, to CYL. A
B – Spring centered, sol. A removed
C – Spring centered
F – Spring offset, to CYL. A shift to center
N – No spring detented

6 Left hand

L – Left hand (single solenoid only)
Blank – Omit when not required

7 Manual override option

Blank – Plain override solenoid ends only
H – Waterproof override solenoid ends only
H2 – Waterproof override both ends of single solenoid
P2 – Plain override both ends of single solenoid
Y – Lockable manual overrides solenoid ends only/DC only
Z – No overrides in either end

8 Response type

X – Fast response
Blank – Standard low shock models

9 Spool control modifications

1 – Stroke adjustment
2 – Pilot choke adjustment
3 – Pilot choke & stroke adjustment
7 – Stroke adjustment CYL. A only
8 – Stroke adjustment CYL. B only
2 -7 – Dual pilot choke & stroke ADJ. A port end only
2 -8 – Dual pilot choke & stroke ADJ. B port end only
Blank – Omit when not required

10 Pilot pressure

E – External pilot pressure
Omit – Internal pilot pressure

11 Pilot drain

T – Internal pilot Drain
Omit – External pilot drain

12 Pressure port check valve

K – 0,35 bar (5 psi cracking pressure
R – 3,45 bar (50 psi cracking pressure
S – 5,20 bar (75 psi cracking pressure
Blank – Omit when not required

13 Solenoid energization identity

Blank – Standard arrangement for ANSI B93.9 (energise solenoid A for flow P to A port)
V – Solenoid identification determined by position of solenoid. (Solenoid A at port A end and/or solenoid B at port B end. (All 4 & 8 spools are always V code)

14 Flag symbol heading electrical options & features

15 Spool indicator switch
Available on high performance models, DG4V-3, only.
Omit when not required.

S1 – Options available on U only)
S2 – Options available on U only)
S3 – Options available on P* only
S4 – Options available on P* only
S5 – Options available on FW/FJ only

16 Coil type

U – ISO 4400
F – Flying lead
SP1 – Single 6,3 MM spade to IEC 760
SP2 – Dual 6,3 MM spade to IEC 760

17 Electrical connections (F type coil only) omit if not required

T – Wired terminal block
PA – Instaplug male receptacle only
PB – Instaplug male & female receptacle
PA3 – Three pin connector
PA5 – Five pin connector

18 Housing (F type coils only)

W – 1/2 NPT thread wiring housing
J – 20 mm thread wiring housing

19 Electrical options

1 – ISO with fitted plug, U type coils only
6 – ISO with fitted plug, & lights U type coils only

20 Solenoid indicator lights (F build only) used with T terminal block models. (Omit if not required)

21 Coil indentification

22 Pilot valve code (tank pressure rating)

2 – 10 bar (145 psi) DG4V3-60
5 – 100 bar (1450 psi) DG4V3S-60
6 – 160 bar (2285 psi) DG4V3-60
7 – 210 bar (3000 psi) DG4V3-60

23 Pilot valve port orifices

24 Design

60 – DG4V3S-60 pilot valve
70 – DG4V3-60 pilot valve

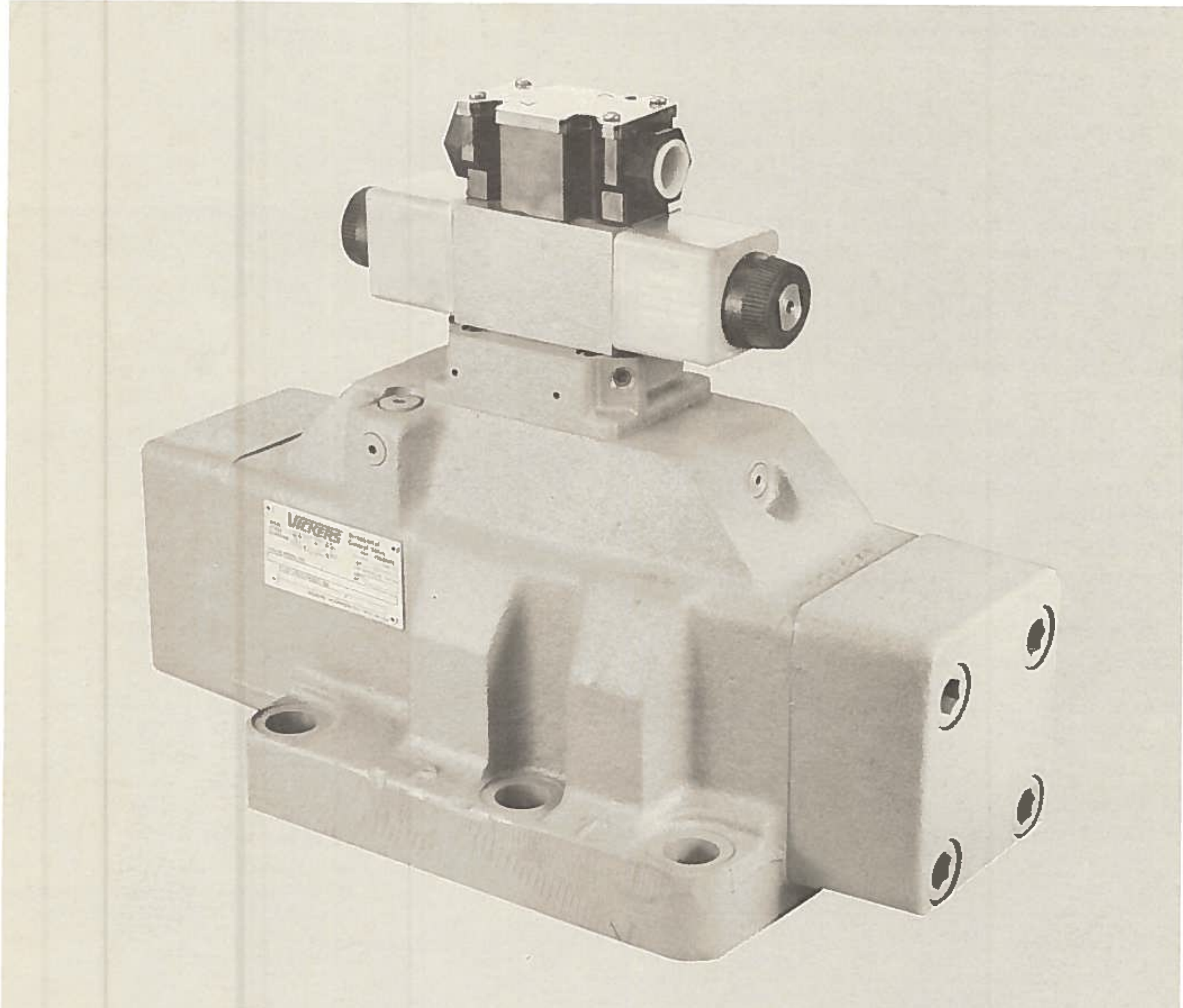
6 Thru 23 included in pilot valve model code

Service Data

VICKERS

Solenoid Controlled Pilot Operated Directional Valves

(F3)DG5S4-10-**(L)(**)(X)(*)(E)(T)(*)-(V)M-(S*)*(**)**(L)***-***-90/100



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Released 05-01-91

I-3890-S

MAIN STAGE SPOOL TYPE	AVAILABLE VALVE TYPE	SPOOL	MAIN STAGE ID PLATE	
			"A" ONLY	B/C/N
0		364037		400976
1		*331404		400977
2		364038		400978
3		*277479		400979
4		281193		400980
6	A/B/C/N	364039	400975	400981
8		364041		400980
9		277563		400976
11		*331404		632700
31		*277479		580475
33		364042		400981

*** SPOOL ASSEMBLY NOTE**
Assemble type 1 & 3 spools with narrow center land toward "A" end of valve. "A" end is defined as being closest to CYL. port "A". Type 11 & 31 spools are installed in reverse of type 1 & 3 with narrow center lands toward "B" end of valve.

■ PLUG TORQUES (OILED)

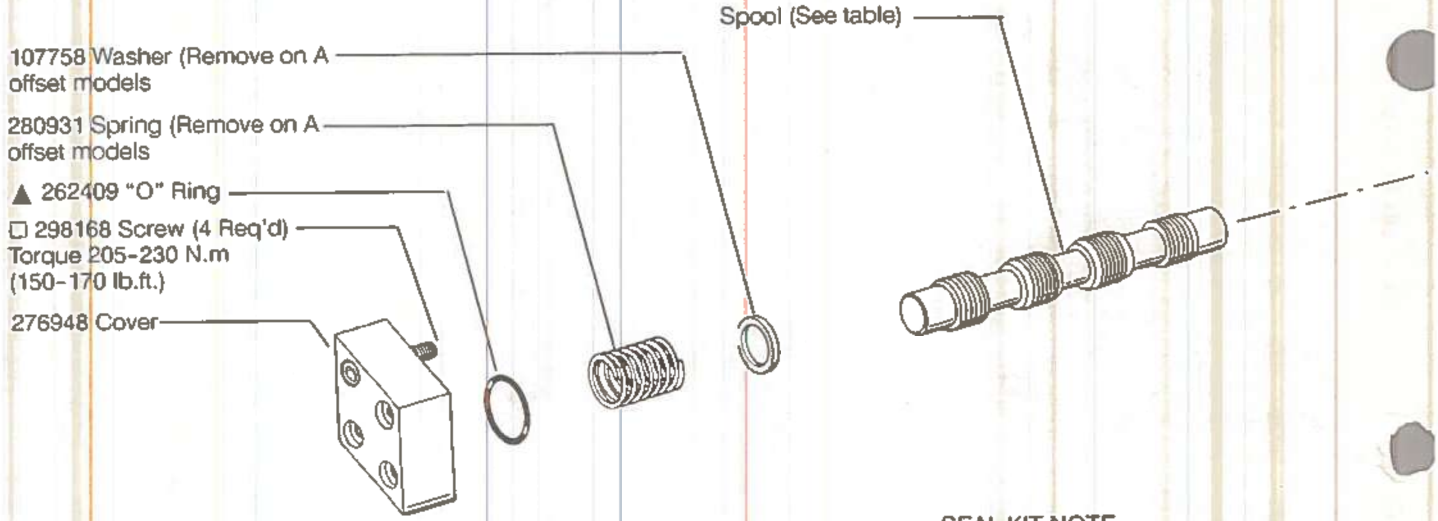
PLUG	N.M	lb. in.
7074	8.5-9.6	75-85
30560	8.5-9.6	75-85
113000	5.0-5.9	45-52
161809	5.0-5.9	45-52
343740	15.0-16.0	133-147
363889	20.5-22.5	181-199
407533	12.1-12.4	107-110

NOTE
SAE straight thread plugs used on exterior of valve.

■ PLUG INSTALLATION TABLE

MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S4-10*	DOES NOT EXIST	30560	——
DG5S4-10*-E		7074	30560
DG5S4-10*-X		——	——
DG5S4-10*-X-E			——
DG5S4-10*-K/R/S	161809	7074	——
DG5S4-10*-E-K/R/S	113000		30560
DG5S4-10*-X-K/R/S	——		——
DG5S4-10*-X-E-K/R/S	113000		——

NOTE
Parts included in service kits are not sold separately.



SEAL KIT NOTE
Valves are manufactured as shown with F3 seals used internally. Interface seals are standard Nitrile material and are converted to F3 in the seal kit. All seals in the seal kit are F3.

VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE
DG5S4-10*A	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3(S)-2A-60
	4 & 8	DG4V-3(S)-2AL-VM-60
DG5S4-10*B	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3(S)-6B-60
	4 & 8	DG4V-3(S)-6BL-VM-60
DG5S4-10*C	0, 1, 2, 3, 6, 9, 11, 31, 33, 52, 521	DG4V-3(S)-6C-60
	4 & 8	DG4V-3(S)-6C-VM-60
DG5S4-10*N	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3(S)-6N-60
	4 & 8	DG4V-3(S)-6N-VM-60

See pilot valve service drawing for parts breakdown

- ▲ Included In F3 Seal Kit 696898
- ★ Included In Plug Kit 941263
- ☐ Included In Fastener Kit 941262
- ◆ Not Available For Sale
- ♣ Used On Check Valve Models Only
- ■ Plug Torques (See Table)
- ● Available Only In Kit Of 25 Each

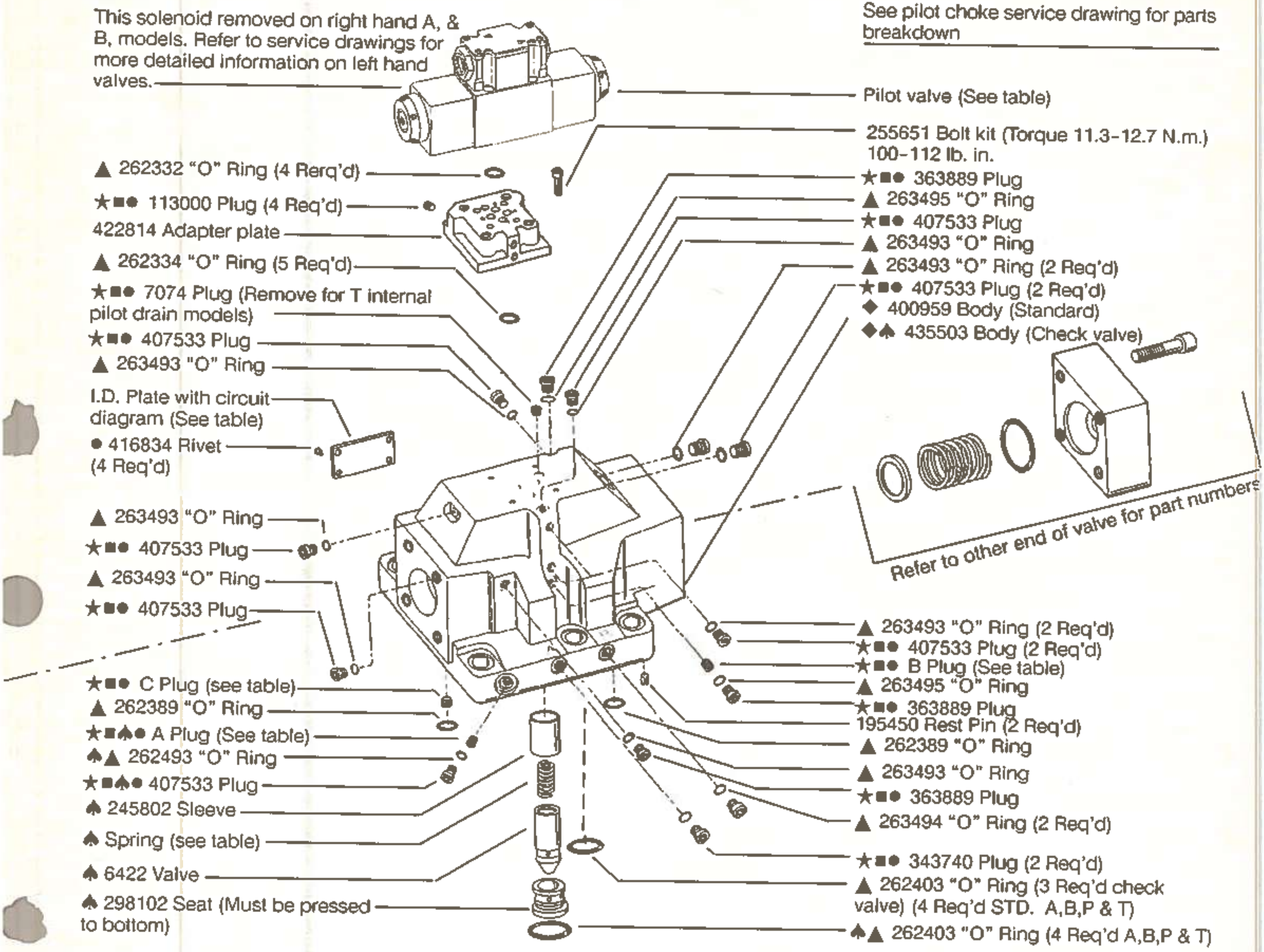
MODEL	♠ SPRING
DG5S4-10-K	247287
DG5S4-10-R	276428
DG5S4-10-S	432353

PILOT STAGE BOLT KIT (INCLUDES 4 ATTACHING BOLTS)

MODEL	BOLT KIT
W/O Pilot choke	696899
W/ Pilot choke	696900

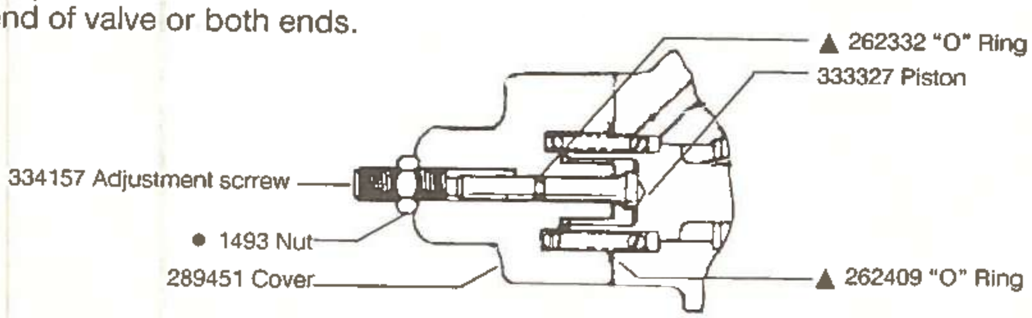
Torque 4.5-5.7 N. m. (40-50 lb. in.)

See pilot choke service drawing for parts breakdown



Stroke Adjustment Parts

(Either end of valve or both ends.



NOTE

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner.

Model Code

(F3)DG5S4–10–* * (L)(**)(X)(*)(E)(T)(*)–(V)M–(S*)*(**)* *(L)** *–***–90/100

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

1 Seals for mineral oil & fire resistant fluids

2 Directional control valve Manifold or subplate mounted Solenoid controlled Pilot operated, Sliding spool 4 way flow direction

3 Interface (Valve size 1-1/4 inch)

10 – NFPA-D10 (ISO-4401-10)

4 Spool type (see table)

5 Spool/Spring arrangement

A – Spring offset, to CYL. A
B – Spring centered, sol. A removed
C – Spring centered
F – Spring offset, to CYL. A shift to center
N – No spring detented

6 Left hand

L – Left hand (single solenoid only)
Blank – Omit when not required

7 Manual override option

Blank – Plain override solenoid ends only
H – Waterproof override solenoid ends only
H2 – Waterproof override both ends of single solenoid
P2 – Plain override both ends of single solenoid
Y – Lockable manual overrides solenoid ends only/DC only
Z – No overrides in either end

8 Response type

X – Fast response
Blank – Standard low shock models

9 Spool control modifications

1 – Stroke adjustment
2 – Pilot choke adjustment
3 – Pilot choke & stroke adjustment
7 – Stroke adjustment CYL. A only
8 – Stroke adjustment CYL. B only
2 –7 – Dual pilot choke & stroke ADJ. A port end only
2 –8 – Dual pilot choke & stroke ADJ. B port end only
Blank – Omit when not required

10 Pilot pressure

E – External pilot pressure
Omit – Internal pilot pressure

11 Pilot drain

T – Internal pilot Drain
Omit – External pilot drain

12 Pressure port check valve

K – 0.35 bar (5 psi cracking pressure
R – 3.45 bar (50 psi cracking pressure
S – 5.20 bar (75 psi cracking pressure
Blank – Omit when not required

13 Solenoid energization identity

Blank – Standard arrangement for ANSI B93.9 (energise solenoid A for flow P to A port)
V – Solenoid identification determined by position of solenoid. (Solenoid A at port A end and/or solenoid B at port B end. (All 4 & 8 spools are always V code)

14 Flag symbol heading electrical options & features

15 Spool indicator switch
Available on high performance models, DG4V-3, only. Omit when not required.

S1 – Options available on U only)
S2 – Options available on U only)
S3 – Options available on P* only
S4 – Options available on P* only
S5 – Options available on FW/FJ only

16 Coil type

U – ISO 4400
F – Flying lead
SP1 – Single 6,3 MM spade to IEC 760
SP2 – Dual 6,3 MM spade to IEC 760

17 Electrical connections (F type coil only) omit if not required

T – Wired terminal block
PA – Instaplug male receptacle only
PB – Instaplug male & female receptacle
PA3 – Three pin connector
PA5 – Five pin connector

18 Housing (F type coils only)

W – 1/2 NPT thread wiring housing
J – 20 mm thread wiring housing

19 Electrical options

1 – ISO with fitted plug, U type coils only
6 – ISO with fitted plug, & lights U type coils only

20 Solenoid indicator lights (F build only) used with T terminal block models. (Omit if not required)

21 Coil indentification

22 Pilot valve code (tank pressure rating)

2 – 10 bar (145 psi) DG4V3-60
5 – 100 bar (1450 psi) DG4V3S-60
6 – 160 bar (2285 psi) DG4V3-60
7 – 210 bar (3000 psi) DG4V3-60

23 Pilot valve port orifices

24 Design

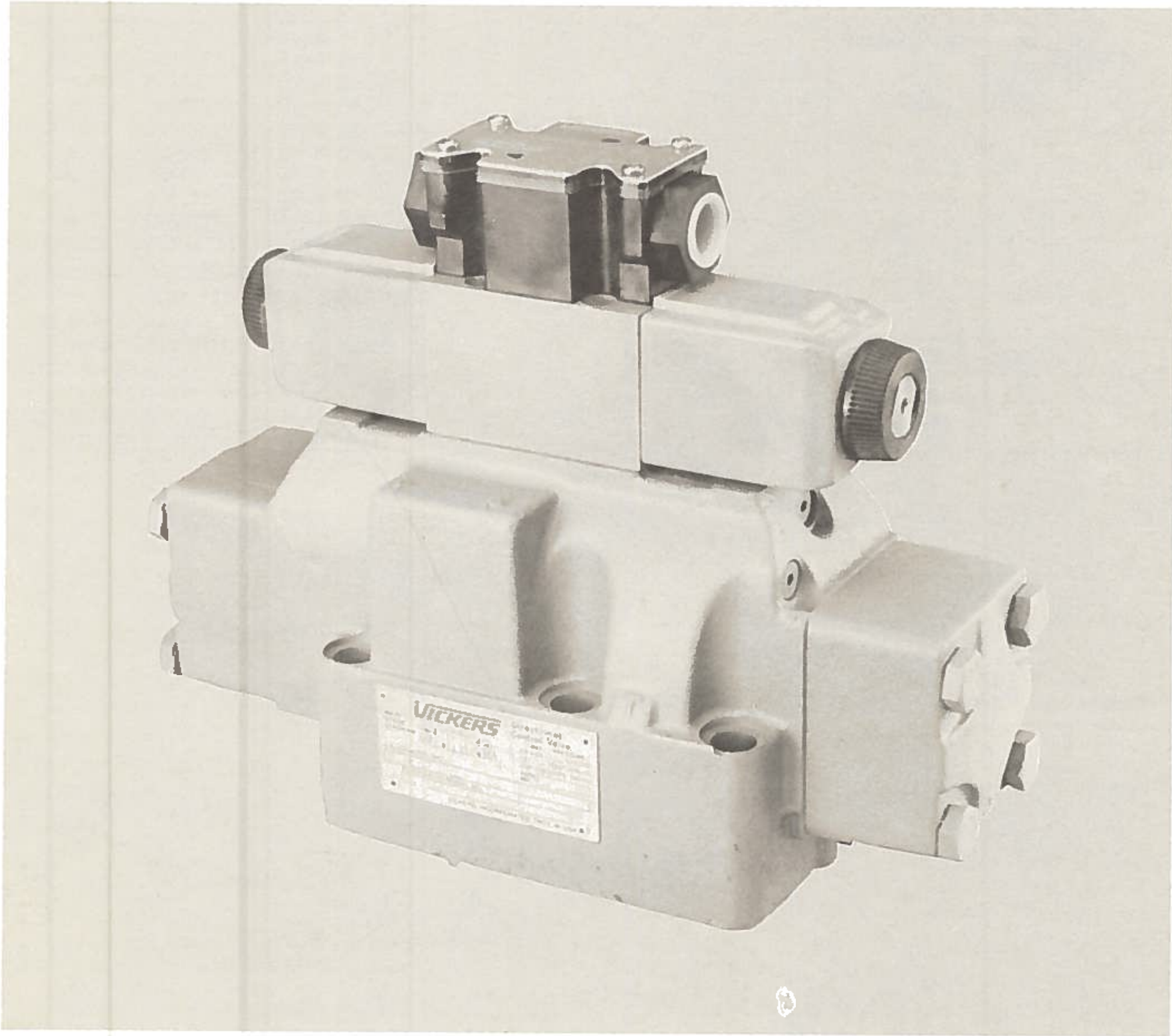
90 – DG4V3S-60 pilot valve
100 – DG4V3-60 pilot valve

6 Thru 23 included in pilot valve model code

Service Data

Solenoid Controlled Pilot Operated Directional Valve

DG5S-8-*D(L)-(*)(X)-(*)-(E)-(T)(*)-(V)M-(S*)-*(**)(L)-***-***-30/40**



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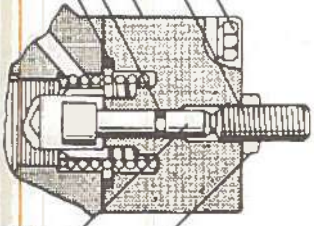
I-3888-S

Parts shown included in stroke ADJ. kit 941154. Stroke ADJ. CYL. "B" end only.



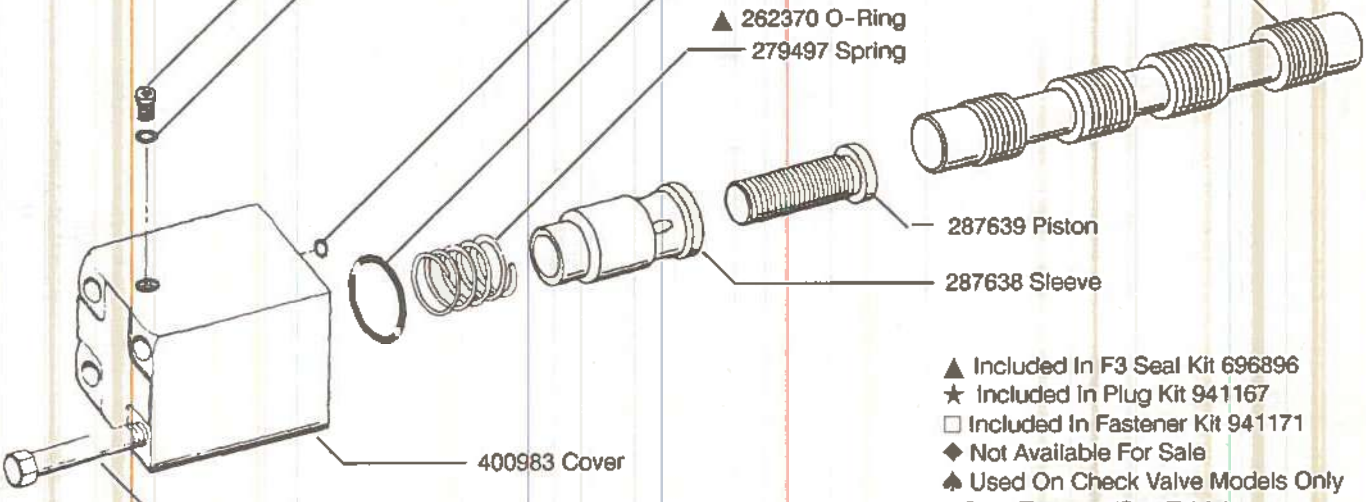
VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE
DG5S-8-*D-30	O, 1, 2, 3, 6, 9,	DG4V-3S-7C-60
DG5S-8-*D-40	11, 31, 33	DG4V-3-7C-60
DG5S-8-*D-30	4 & 8	DG4V-3S-78C-60
DG5S-8-*D-40		DG4V-3S-78C-60

See pilot valve service drawing for parts breakdown

MAIN STAGE SPOOL TYPE	SPOOL	ID PLATE
DG5S-8-OD	363495	400967
DG5S-8-1D	*276623	400968
DG5S-8-2D	363496	400969
DG5S-8-3D	*276625	400970
DG5S-8-4D	276626	400971
DG5S-8-6D	363498	400972
DG5S-8-8D	363499	400971
DG5S-8-9D	363500	400967
DG5S-8-11D	*276623	573685
DG5S-8-31D	*276625	573685
DG5S-8-33D	363501	400972

* SPOOL ASSEMBLY NOTE
Assemble type 1 & 3 spools with narrow center land toward "A" end of valve. "A" end is defined as being closest to CYL. port "A". Type 11 & 31 spools are installed in reverse of type 1 & 3 with narrow center lands toward "B" end of valve.

■ PLUG	TORQUES (OILED)	
	N.m.	lb. in.
113000 237588	5.0-5.9	45-52
343740	15.0-16.0	133-142
398071	9.8-10.2	87-90
407533	12.1-12.4	107-110



▲ Included In F3 Seal Kit 696896
★ Included In Plug Kit 941167
□ Included In Fastener Kit 941171
◆ Not Available For Sale
♠ Used On Check Valve Models Only
■ Plug Torques (See Table)
● Available Only In Kit Of 25 Each

PILOT STAGE BOLT KIT (INCLUDES 4 ATTACHING BOLTS)	
MODEL	BOLT KIT
W/O Pilôt choke	696892
W/ Pilot choke	696893

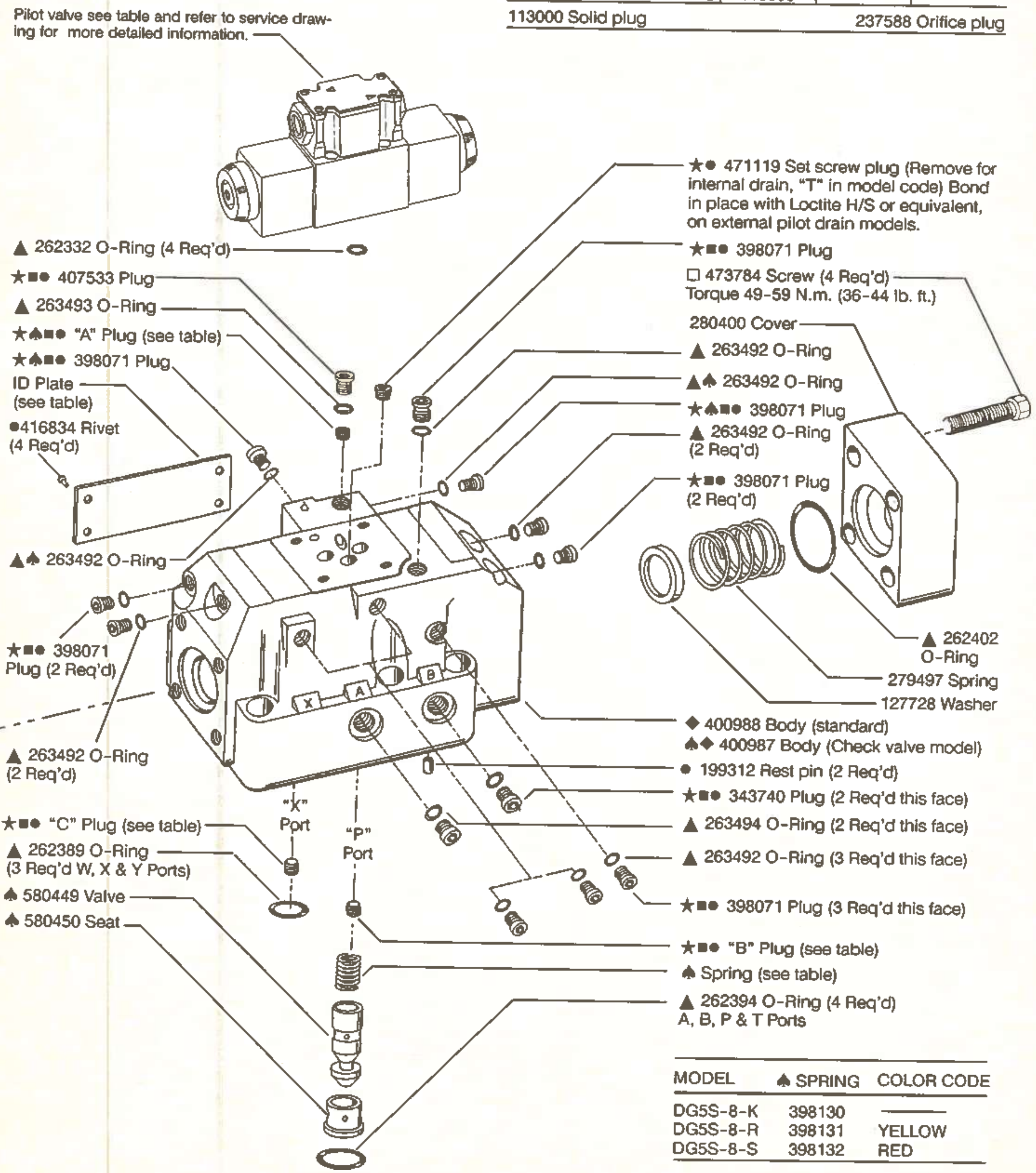
Torque 4.5-5.7 N. m. (39.8-50.4 lb. in.)

See pilot choke service drawing for parts breakdown

■ PLUG INSTALLATION TABLE

MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S-8-*D-**	DOES NOT EXIST	237588	———
DG5S-8-*D-**-E		113000	237588
DG5S-8-*D-**-X		———	———
DG5S-8-*D-**-X-E		113000	———
DG5S-8-*D-**-KRS	237588	DOES NOT EXIST	———
DG5S-8-*D-**-E-KRS	113000		237588
DG5S-8-*D-**-X-KRS	———		———
DG5S-8-*D-**-X-E-KRS	113000		———

113000 Solid plug 237588 Orifice plug



MODEL	♠ SPRING	COLOR CODE
DG5S-8-K	398130	———
DG5S-8-R	398131	YELLOW
DG5S-8-S	398132	RED

Model Code

(F3)DG5S–8–* D (L)(*)(X)–(*)–(E)–(T)(*)–(V)M–(S*)*(**) * * (L)–** 5–***–30/40

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24

1 Seals for mineral oil & fire resistant fluids

2 Directional control valve
Manifold or subplate mounted
Solenoid controlled
Pilot operated
Rated pressure 210 Bar (3000 psi)

3 Interface

8 – NFPA-D06 (ISO-4401-08)

4 Spool type (see table)

5 Spool/Spring arrangement

D – Pressure centered

6 Left hand

L – Left hand (single solenoid only)
Blank – Omit when not required

7 Manual override option

Blank – Plain override solenoid ends only
H – Waterproof override solenoid ends only
H2 – Waterproof override both ends of single solenoid
P2 – Plain override both ends of single solenoid
Y – Lockable manual overrides solenoid ends only/DC only
Z – No overrides in either end

8 Response type

X – Fast response
Blank – Standard low shock models

9 Spool control modifications

2 – Pilot choke adjustment
8 – Stroke adjustment CYL. B only
2 –8 – Dual pilot choke & stroke ADJ. B port end only
Blank – Omit when not required

10 Pilot pressure

E – External pilot pressure
Omit – Internal pilot pressure

11 Pilot drain

T – Internal pilot Drain
Omit – External pilot drain

12 Pressure port check valve

K – 0.35 bar (5 psi cracking pressure
R – 3.45 bar (50 psi cracking pressure
S – 5.20 bar (75 psi cracking pressure
Blank – Omit when not required

13 Solenoid energization identity

Blank – Standard arrangement for ANSI B93.9 (energise solenoid A for flow P to A port)
V – Solenoid identification determined by position of solenoid. (Solenoid A at port A end and/or solenoid B at port B end.
(All 4 & 8 spools are always V code)

14 Flag symbol heading electrical options & features

15 Spool indicator switch
Available on high performance models, DG4V-3, only.
Omit when not required.

S1 – Options available on U only)
S2 – Options available on U only)
S3 – Options available on P* only
S4 – Options available on P* only
S5 – Options available on FW/FJ only

16 Coil type

U – ISO 4400
F – Flying lead
SP1 – Single 6,3 MM spade to IEC 760
SP2 – Dual 6,3 MM spade to IEC 760

17 Electrical connections (F type coil only) omit if not required

T – Wired terminal block
PA – Instaplug male receptacle only
PB – Instaplug male & female receptacle
PA3 – Three pin connector
PA5 – Five pin connector

18 Housing (F type coils only)

W – 1/2 NPT thread wiring housing
J – 20 mm thread wiring housing

19 Electrical options

1 – ISO with fitted plug, U type coils only
6 – ISO with fitted plug, & lights
U type coils only

20 Solenoid indicator lights (F build only) used with T terminal block models. (Omit if not required)

21 Coil indentification

22 Pilot valve code (tank pressure rating)

2 – 10 bar (145 psi) DG4V3-60
5 – 100 bar (1450 psi) DG4V3S-60
6 – 160 bar (2285 psi) DG4V3-60
7 – 210 bar (3000 psi) DG4V3-60

23 Pilot valve port orifices

24 Design

30 – DG4V3S-60 pilot valve
40 – DG4V3-60 pilot valve

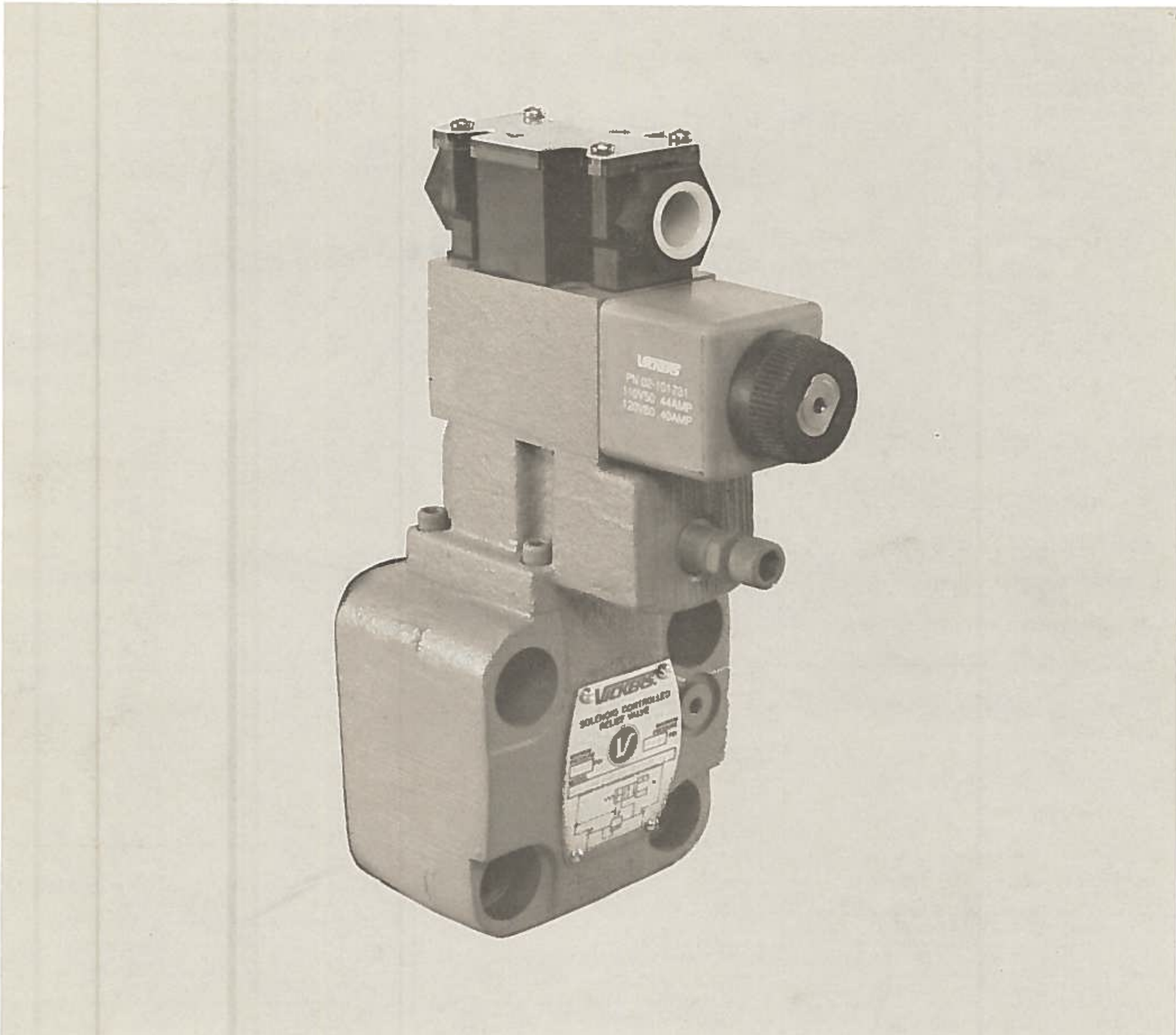
6 Thru 23 included in pilot valve model code

Service Data

VICKERS

Solenoid Controlled Pilot Operated Relief Valves

(F3)-C/G/S/T5-(H)-03/06***(V)**(V)-M-(S*)*****(L)******-100/110-EN**



Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
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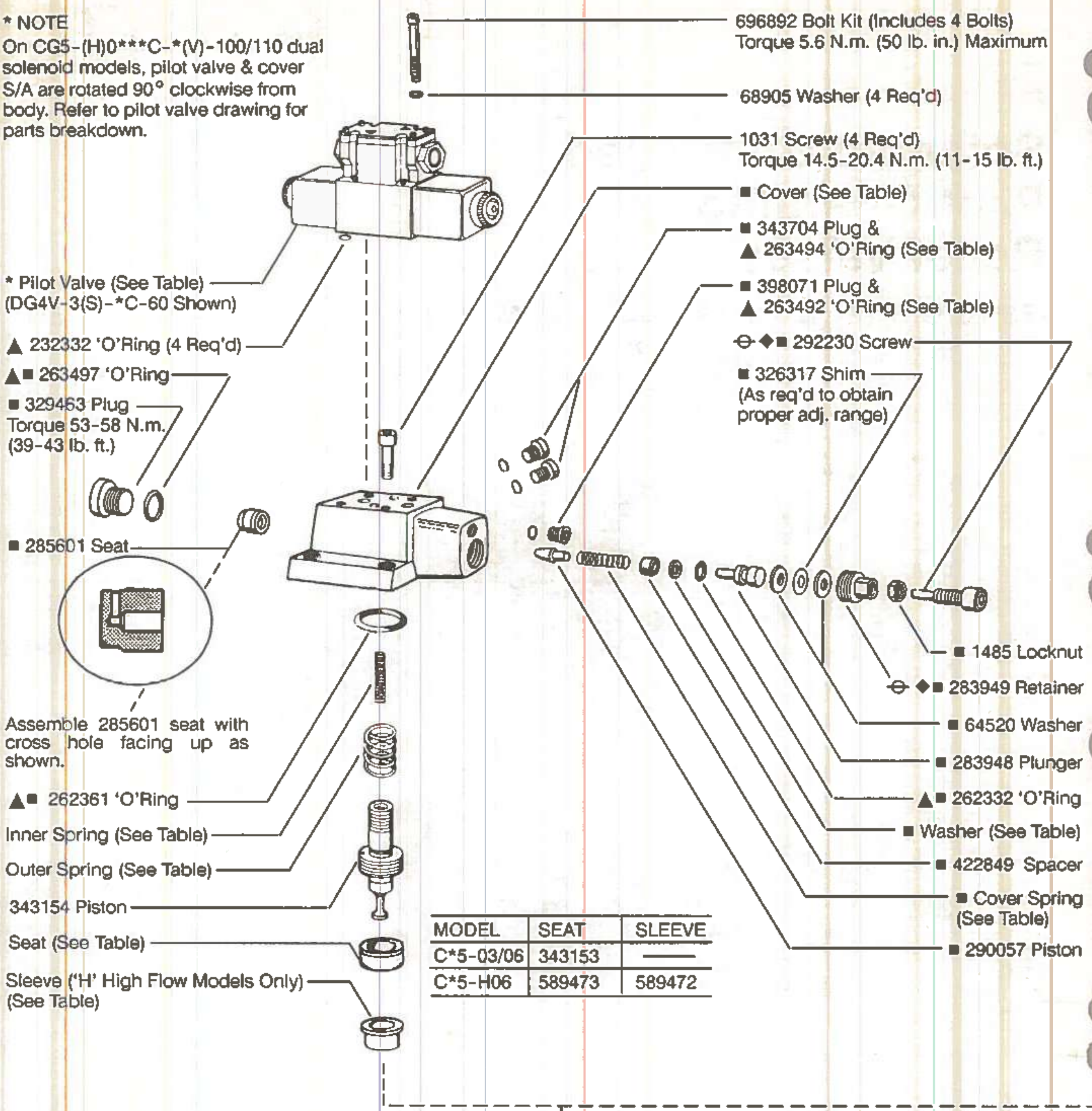
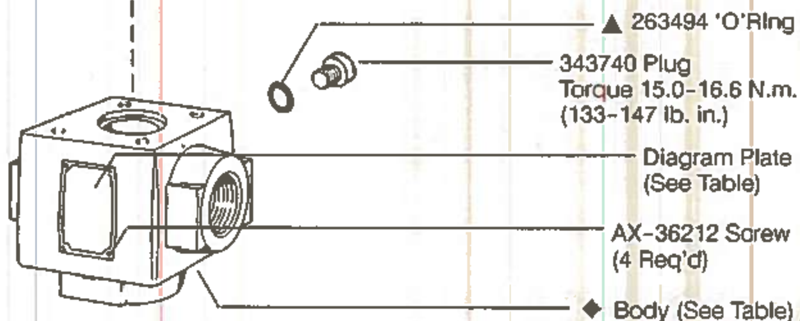
Released 06-01-91

I-3780-S

* NOTE
On CG5-(H)0***C-*(V)-100/110 dual solenoid models, pilot valve & cover S/A are rotated 90° clockwise from body. Refer to pilot valve drawing for parts breakdown.



MODEL	SEAT	SLEEVE
C*5-03/06	343153	———
C*5-H06	589473	589472

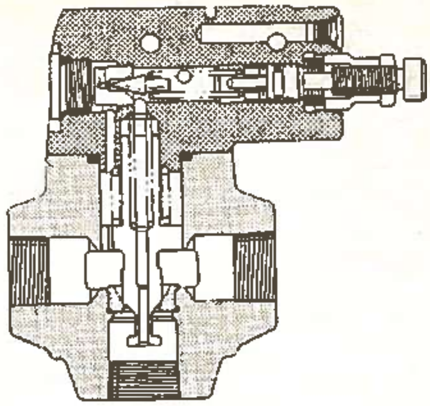


MODEL	■ COVER S/A
C*5-(H)0*0A/F-B(V)-100/110	942432
C*5-(H)0*0A/F-C(V)-100/110	942433
C*5-(H)0*0A/F-F(V)-100/110	942434
C*5-(H)0*1A-B(V)-100/110	942435
C*5-(H)0*2A-B(V)-100/110	
C*5-(H)0**C-B(V)-100/110	
C*5-(H)0*1A-C(V)-100/110	942436
C*5-(H)0*2A-C(V)-100/110	
C*5-(H)0**C-C(V)-100/110	
C*5-(H)0*1A-F(V)-100/110	942437
C*5-(H)0*2A-F(V)-100/110	
C*5-(H)0**C-F(V)-100/110	

MODEL	◆ BODY
CS5-03**-*-100/110	590407
CS5-(H)06**-*(V)-100/110	581701
CT5-06**-*-100/110	590348

MODEL	DIAGRAM PLATE	* PILOT VALVE
C*5 -(H)0*0A(P)-*(V)-M-***-100	422864	DG4V-3S-0BL-M***-60
C*5 -(H)0*0A(P)-*(V)-M-***-110		DG4V-3-0BL-M***-60
C*5 -(H)0*1A(P)-*(V)-M-***-100	422865	DG4V-3S-2AL-M***-60
C*5 -(H)0*1A(P)-*(V)-M-***-110		DG4V-3-2AL-M***-60
C*5 -(H)0*2A(P)-*(V)-M-***-100	423814	DG4V-3S-2BL-M***-60
C*5 -(H)0*2A(P)-*(V)-M-***-110		DG4V-3-2BL-M***-60
C*5 -(H)0*0C-*(V)-M-***-100	422862	DG4V-3S-0C-M***-60
C*5 -(H)0*0C-*(V)-M-***-110		DG4V-3-0C-M***-60
C*5 -(H)0*2C-*(V)-M-***-100	422863	DG4V-3S-2C-M***-60
C*5 -(H)0*2C-*(V)-M-***-110		DG4V-3-2C-M***-60
C*5 -(H)0*0F(P)-*(V)-M-***-100	477211	DG4V-3S-0FL-M***-60
C*5 -(H)0*0F(P)-*(V)-M-***-110		DG4V-3-0FL-M***-60

* Refer to pilot valve drawing for parts breakdown.



Relief valve sectional view without pilot valve

MODEL	■ COVER	■ PLUG/'O'RING (2 REQ'D)	■ PLUG/'O'RING
C*5-(H)0*0A-100/110	422828	——	——
C*5-(H)0*1A-100/110	424203	343740/▲ 263494	398071/▲ 263492
C*5-(H)0*2A-100/110			
C*5-(H)0**C-100/110			

MODEL	■ WASHER	INNER SPRING	OUTER SPRING	■ COVER SPRING
C*5-0***-B-100/110	——	2077	——	2280
C*5-H0***-BV-100/110		——	184458	
C*5-0***-C-100/110	233110	2077	——	583937
C*5-H0***-CV-100/110		——	184458	
C*5-0***-F-100/110	——	2077	——	2281
C*5-H0***-FV-100/110		——	184458	

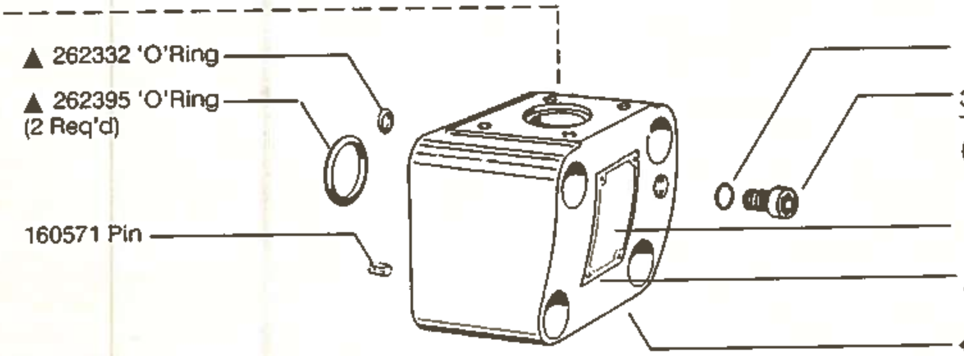
■ Included In Cover S/A

⊖ Lubricate With Oil Before Assembly

▲ Included In F3 Seal Kit 696929 (includes pilot valve seals)

◆ Not Available For Sale

NOTE
Parts Prefixed With A Symbol Available Only In Kits.



CG5-(H)06

Model Code

(F3)–C * 5–(H) ** * *–* (V)**(V)–M–(S*)–* ** * * (L)–** * ***–100/110–EN**

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

1 Seals for mineral oil & fire resistant fluids

2 Relief valve

3 Connections

G – Subplate mounting
S – Straight threads
T – NPTF threads

4 Solenoid controlled

5 High flow
Omit for standard models

6 Valve size

03 – 3/8"-.8750 straight thread
06 – 3/4"-1.0625 straight thread or 3/4" NPTF

7 Pilot spool function

0,1, or 2 Indicates venting condition

8 Pilot spool spring arrangement

A – Spring offset
C – Spring centered
F – Spring centered, shift to center

9 Pressure range

B – 125-1000 psi
C – 500-2000 psi
F – 1500-3000 psi

10 High vent (Req'd for high flow models)

Blank – Omit for low vent models

11 Manual override options (included in pilot valve model code)

Blank – Plain override solenoid ends only
H – Waterproof override solenoid ends only
H2 – Waterproof override both ends of single solenoid
M – Serviceable manual overrides in solenoid ends only
P2 – Plain override both ends of single solenoid
Y – Lockable manual overrides solenoid ends only
Z – No overrides in either end

12 Solenoid energization identity

Blank – Standard arrangement for ANSI B93 9 (energise solenoid A for flow P to A port)
V – Solenoid identification determined by position of solenoid. (Solenoid A at port A end and/or solenoid B at port B end. (All 4 & 8 spools are always V code)

13 Flag symbol heading electrical options & features

14 Spool position monitoring switch (tank pressure rating 10 bar only)

S1 – Switch, normally open, U coils only
S2 – Switch, normally closed, U coils only
S3 – Switch, wired normally open, P*
S4 – Switch, wired normally closed, P*
S5 – Switch, free leads, FW & FJ only

15 Coil type

U – ISO 4400
F – Flying lead
SP1 – Single 6,3 series spade to IEC 760
SP2 – Dual 6,3 series spade to IEC 760

16 Electrical connections (F type coil only) omit if not required

T – Wired terminal block
PA – Instaplug male receptacle only
PB – Instaplug male & female receptacle
PA3 – Three pin connector
PA5 – Five pin connector

17 Housing (F type coils only)

W – 1/2 NPT thread wiring housing
J – 20 mm thread wiring housing

18 Electrical options

1 – ISO with fitted plug, U type coils only
6 – ISO with fitted plug, with lights, U type coils only

19 Solenoid indicator lights (F build only) To be used with T terminal block models.
(Omit if not required)

20 Coil indentification

21 Pilot valve code (tank pressure rating)

2 – 10 bar (145 psi) use with switch models S*
5 – 100 bar (1450 psi) DG4V-3S-60
6 – 160 bar (2300 psi) DG4V-3-60
7 – 210 bar (3000 psi) DG4V-3-60

22 Pilot valve port orifices

23 Design

100 – DG4V3S-60
Standard pilot valve
110 – DG4V3-60
High performance pilot valve

24 Special modifications (omit if not required)

11 Thru 22 included in pilot valve model code

Power plugs for proportional valves

EHH-AMP-702-D-10
EHH-AMP-702-E-10

1. General description

These plugs, conforming to ISO 4400/ DIN 43650 interface, offer a low-cost control solution for direct solenoid-operated, non-feedback, hydraulic proportional valves through the use of an integral amplifier.

Adjustments of "gain", "ramp time" and "deadband" can be made directly at the plug. Two ranges of ramp times are offered:

– model type D, 10-600 ms.
– model type E, 0,5-5s.

The proportional plug is controlled with a 0-10V command signal to give maximum currents, adjustable with the "gain" control, between 0,5A and 1,8A.

2. Features and benefits

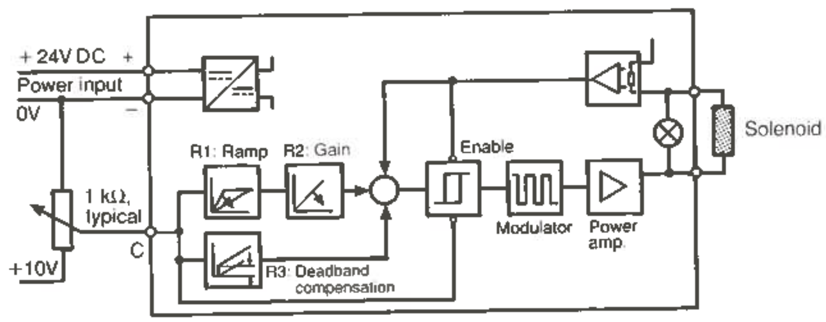
- Integral amplifier provides essential functions for control of proportional valves
- Adjustable ramp time
- Adjustable deadband compensation
- Adjustable gain
- Ease of installation, with reduced cost
- Reduction of EMI radiation
- Fully short-circuit and reverse-polarity protected

3. Application

Primary applications are in the control of directly operated, non-feedback proportional valves where the cost of more sophisticated electronic controls can be avoided.

The combination of proportional valve and plug offers very low cost solutions to many hydraulic actuator control problems requiring smooth acceleration and deceleration.

Electrical block function diagram



4. Model code

EHH-AMP-702- * - 1*

1 2

1 **Adjustment range**
D = Proportional plug: 10 ms to 600 ms
E = Proportional plug: 0,5s to 5s

2 **Design number, 10 series**
Subject to change: installation dimensions unaltered for design numbers 10 to 19 inclusive.

5. Operating data

5.1 Electrical

Power supply	20-28V DC: incl. ±10% max. ripple peak-to-peak
Protection	IEC 529; IP65 (when correctly installed with interface seal in place) Fully short-circuit and reverse-polarity protected
Isolation to VDE 0110	Group "B"
Output current: rated cut-off short-circuit	 1,6A 3A 0,1A rms typical
Output voltage	Typically 0,55V below input voltage
Max. load impedance at 20V supply voltage	19 ohms (1,0A) 12 ohms (1,6A) 9 ohms (2,0A)
Command signal: for no output for output	 0 to 100 mV 200 mV to 10V
Input impedance (signal)	2700 ohms
PWM frequency	400 Hz typical
Ramp time: model type **D** model type **E**	 10 ms to 600 ms 0,5s to 5s
Gain	0,05 A/V to 0,18 A/V
Deadband compensation	0 to 1A

5.2 Mechanical

Housing	PA6 glass reinforced plastic (conforming to UL-94HB) Color: gray
Mounting interface	ISO 4400 (DIN 43650)
Cable clamp	Pg9 screw type
Cable diameter	Ø5 to 10 mm (0.197 to 0.394" dia)
Wire section	0,5 to 1,0 mm^2 (0.001-0.002 in^2) (20AWG-18AWG)
Temperature, ambient range	−20 to +70°C (−4 to +158°F)
Mass	0,07 kg (0.154 lb)

5.3 Functions

- Ramp

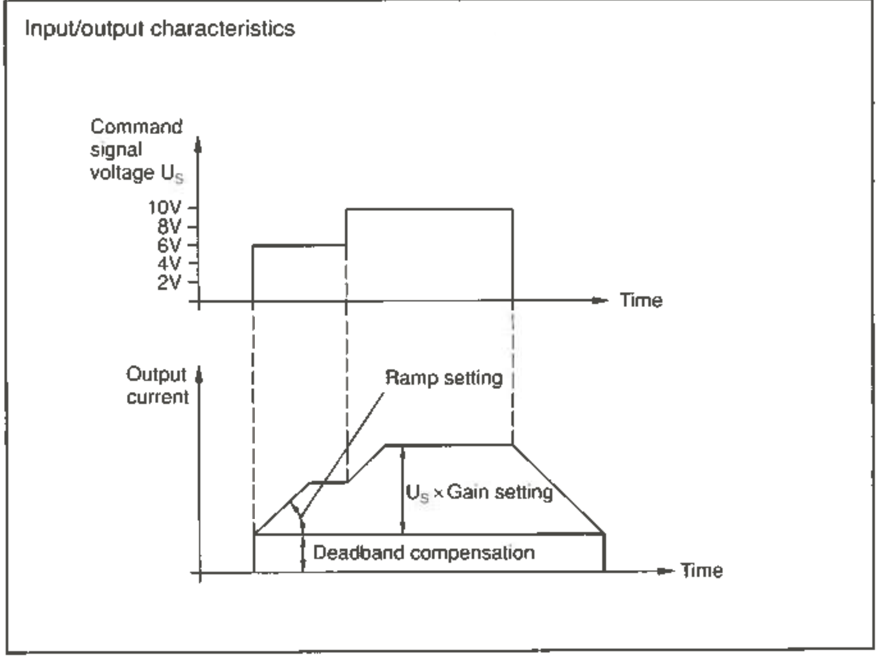
Ramp time is adjustable by potentiometer R1.

- Gain

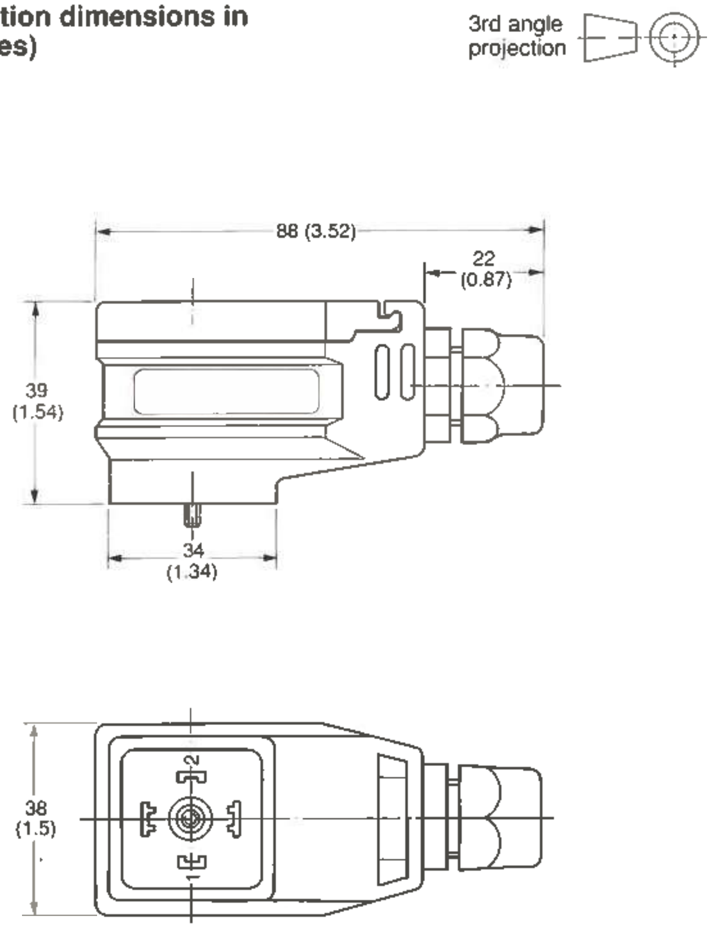
Amplifier gain is adjustable by potentiometer R2.

- Deadband compensation

Deadband compensation is adjustable by potentiometer R3, and is switched on at triggering voltage of 200 mV.



6. Installation dimensions in mm (inches)



7. Installation data

Commissioning (start-up) procedure

1. Correctly wire the plug and, before mounting it on the valve solenoid, apply 24V DC (20 to 28V limits) to the "power input" terminal.

2. Check for correct plug function by illumination/non-illumination of the LED: The LED should illuminate when the voltage applied to the "signal input" terminal is more than 100 mV, (max. 10V) and should not be illuminated when the applied voltage is less than 100 mV.

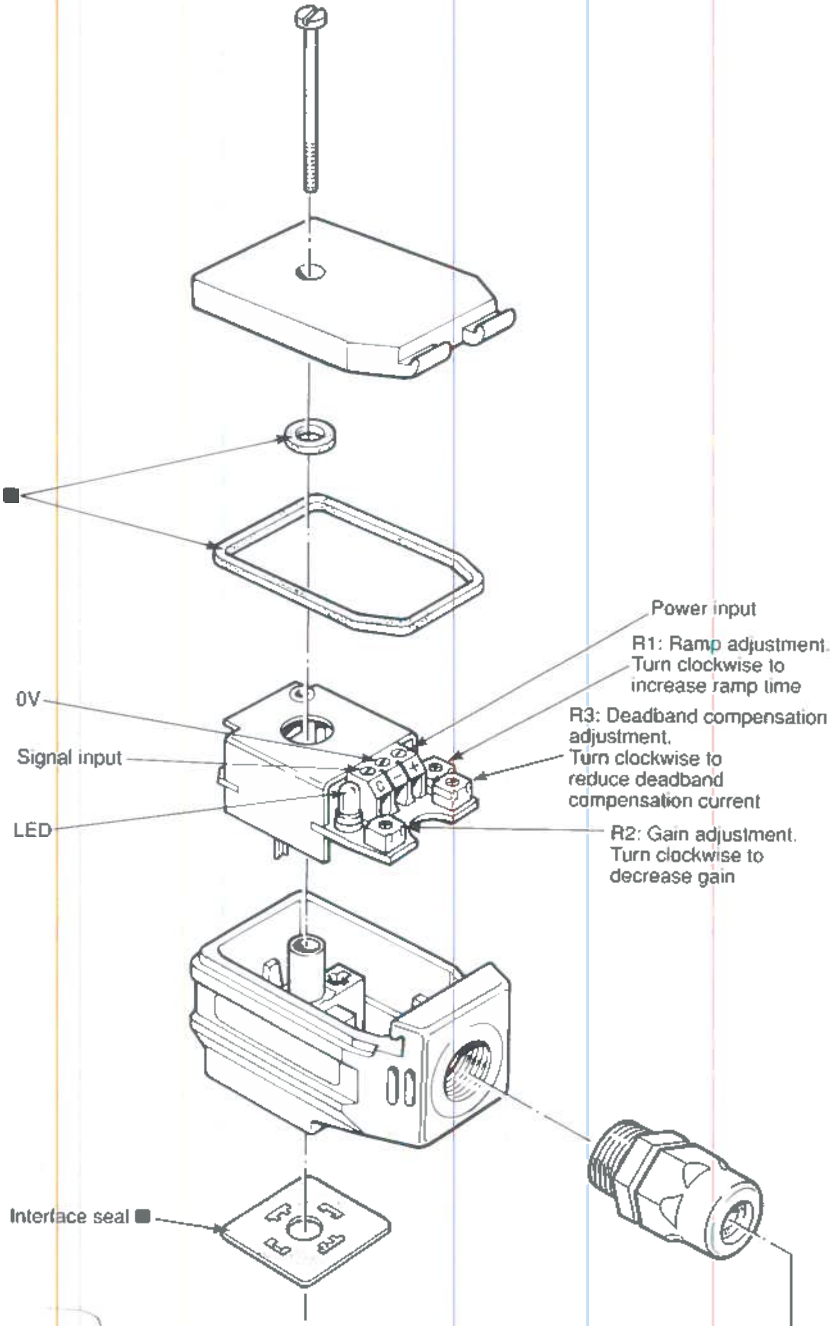
If there is a malfunction a new plug must be fitted.

3. Switch off power supply and command/input signal and then install plug on solenoid. Ensure that all seals are fitted correctly and clamped as the retaining bolt is tightened: *this is essential in providing IP65 protection.*

4. *Ensure that the hydraulic system will not cause any unsafe movement of actuators, then:*
– Switch on power supply again.
– Repeat LED/function check as in 2.
An LED malfunction now indicates a short circuit at the load.

5. Successful completion of these checks means that the plug and load are ready for use.

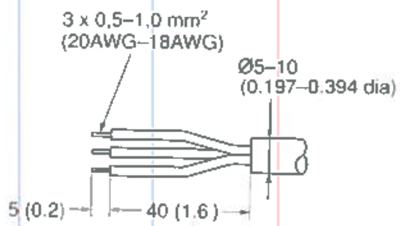
Assembly showing wiring connection points, LED and adjustment potentiometers



Warnings
- Ensure cable clamp nut is adequately tightened to secure the cable
- Do not install, or remove, the plug when power is on
- Do not connect, or disconnect, the wiring while power is on

■ All seals must be fitted correctly at plug installation to provide protection to IP65 (IEC 529)

Wiring preparation



8. Spare parts

The only spare part available is the interface seal, part number 732100.

9. Ordering procedure

Order plug by full model code, and spare interface seals by part number 732100.

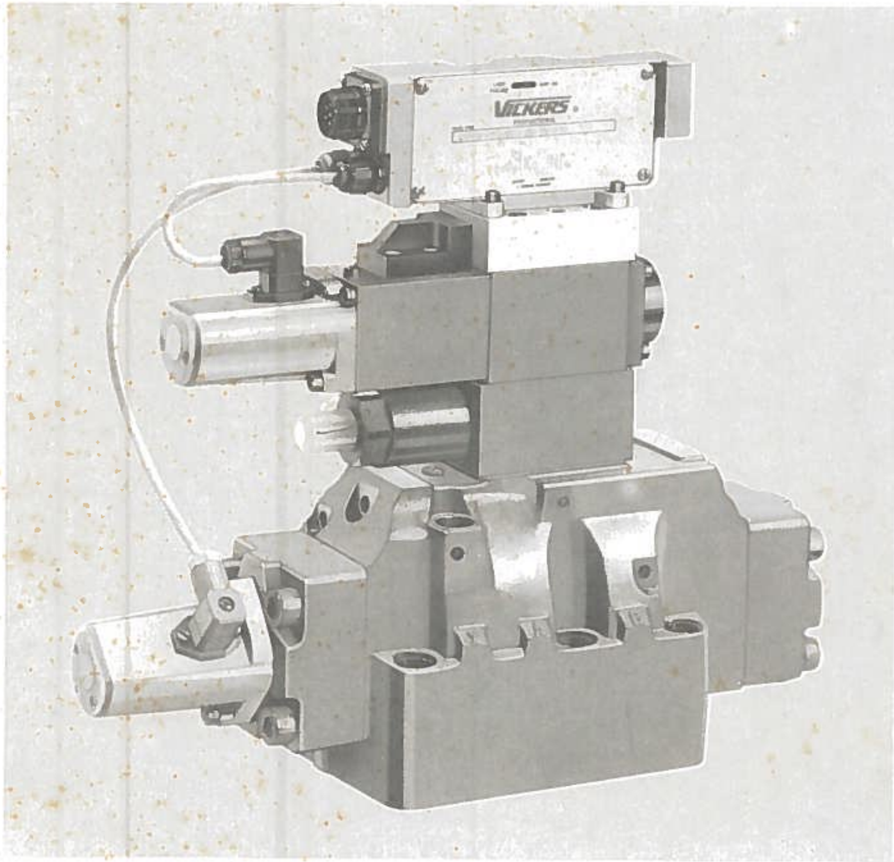
Presented by:

VICKERS
A TRINOVA Company

Printed in Germany

Proportional Directional Valves with Integral Electronics

KAD/TG4V-3/5, 20/30 series
KAFD/TG4V-3/5, 20 series
KASDG4V-3, 10 series
KAF/HDG5V-5/7/8, 10/20 series



Introduction

The hydraulic performance of the valves in this range of integrated assemblies is identical to that shown in Vickers "Proportional Valves" catalog GB-C-2007B. All options shown in GB-C-2007B (e.g. spool type and flow rating, etc.) are applicable to these valves, the only exceptions being changes to electrical features.

The reader should refer to GB-C-2007B for all hydraulic performance data and valve selection.

1. General Description

A range of proportional directional and throttle valves with control amplifiers built directly on, and pre-wired to, the valves. Factory-set adjustments of gain, balancing deadband and dither ensure high repeatability valve to valve.

The only electrical inputs required are power supply (24V or 12V DC according to model type) and a voltage command signal of ±10V. The amplifier is housed in a robust metal enclosure, sealed against ingress from spray and splashing of water and other fluids. Electrical connections are via a standard 7-pin plug.

Two LEDs give status of "Power on" (green) and LVDT failure indication (red). A monitor point allows the function of the amplifier to be checked. Ramp functions, if required, must be generated externally.

Vickers offers a range of auxiliary rail-mounting electronic control modules ideally suited for signal processing, e.g. ramp functions, converter, etc. See catalogs GB-C-2164/2174/2175 for details.

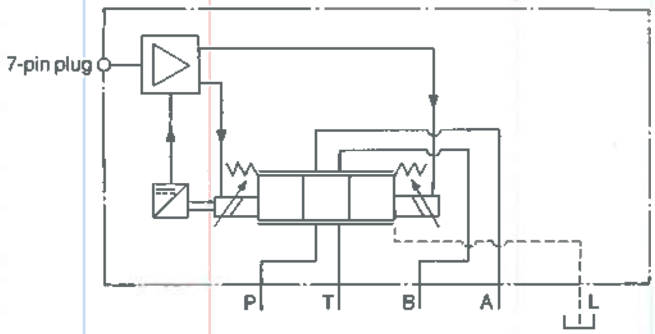
2. Features and Benefits

- Factory-sealed adjustments increase valve-to-valve accuracy, and simplify system set-up
- Valve and amplifier selected, ordered, delivered and installed as a performance-tested package
- Standard 24V DC supply with wide tolerance band
- Non-feedback models available for 12V DC
- Standard ±10V DC command signals
- Installation wiring reduced and simplified
- Standard 7-pin connector plug
- LED status indication and monitor point help trouble shooting
- Simple valve removal and replacement
- Vibration and shock tested
- Supported by auxiliary function modules

3. Functional Symbols

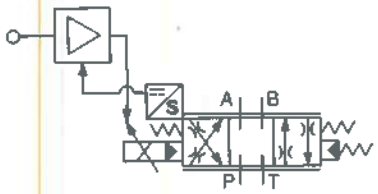
Refer to GB-C-2007B for all available valve and spool symbols.

Single-stage valves
KAFDG4V-3 example

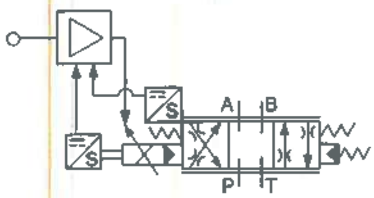


2-stage valves
Simplified symbols

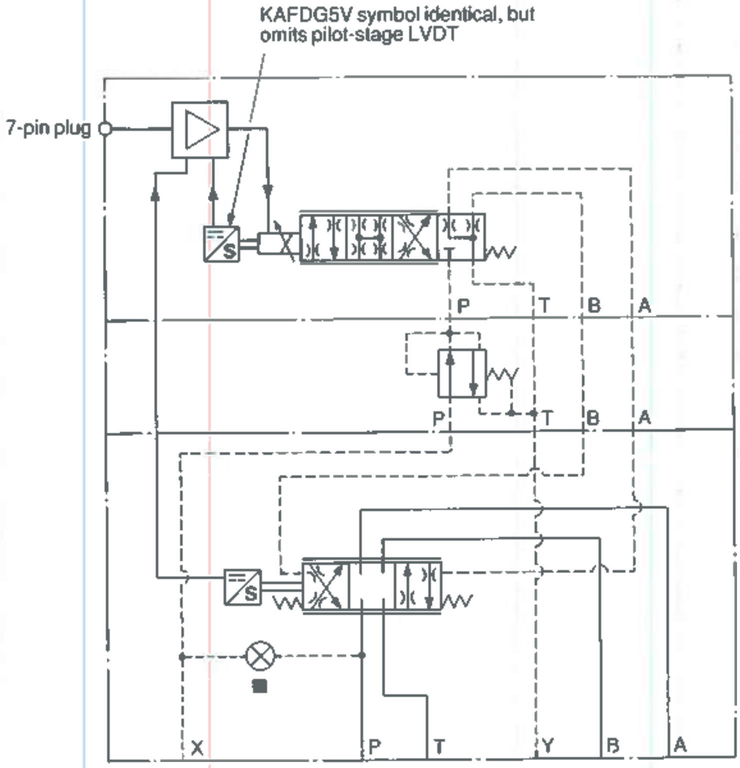
KAFDG5V models



KAHDG5V models



Detailed symbol, KAHDG5V example



■ *Internal plug shown, for external pilot supply; omit plug for internal pilot supply. See "Application note B" and [5] in model code in catalog GB-C-2007B.*

4. Model Codes

Model codes used to identify proportional valves with integral amplifiers are based on model codes of the basic valves (as found in catalog GB-C-2007B), with differences to show:
– The "integrated amplifier" series.
– New plug and electrical definitions.

Model codes listed below refer to GB-C-2007B for the basic valve options, [1], [2], [3], etc. The following new features are referenced by letters, [a], [b], etc.

[a] **Series type designator**
A = Integrated amplifier

[b] **Solenoid connection type**
F = Flying lead

[c] **Electrical connection**
PD7 = 7-pin electrical plug

[d] **Power supply voltage**
G = 12V DC (10 to 20V DC) ▲
H = 24V DC (18 to 36V DC)

▲ *Available only on valves without feedback, i.e KADG4V-3 & 5 and KATG4V-3 & 5*

Single-stage directional valves, without feedback
Reference basic valve type:KDG4V-3 & 5

Model code with integrated amplifier

[1] [2] [3] [4] [5] [7] [8]

K **A** DG4V- * -** C ***- * -(V)M **F PD7-** * * -**

[a] [b] [c] [d]

Single-stage throttle valves, without feedback
Reference basic valve type: KTG4V-3 & 5

Model code with integrated amplifier

[1] [2] [3] [4] [5] [7]

K **A** TG4V- * - ** B ***- * -(V)M **F PD7-** * 7 -**

[a] [b] [c] [d]

Single-stage directional valves, with feedback
Reference basic valve type: KFDG4V-3 & 5

Model code with integrated amplifier

[1] [2] [3] [4] [5] [6]

K **A** FDG4V- * -** C ***-Z-(V)M **F PD7-H** * -**

[a] [b] [c] [d]

Single-stage throttle valves, with feedback
Reference basic valve type: KFTG4V-3 & 5

Model code with integrated amplifier

[1] [2] [3] [4] [5] [6]

K **A** FTG4V- * -** C ***-Z-(V)M **F PD7-H** * -**

[a] [b] [c] [d]

Single-stage valve for closed loop applications
Reference basic valve type: KSDG4V-3

Model code with integrated amplifier

[1] [2] [3] [4]

K **A** SDG4V-3- * * L-** M **F PD7-H** 7 -**

[a] [b] [c] [d]

Two-stage directional valves, with feedback
Reference basic valve type: KF/HDG5V-5, 7 & 8

Model code with integrated amplifier

[1] [2] [3] [4] [5] [6]

K **A** F/H DG5V- * -** C ****-(E)X-VM **F PD7-H** 1 -**

[a] [b] [c] [d]

5. Operating Data

For all other applicable valve operating data, refer to GB-C-2007B.

Power supply: Models with feedback Models without feedback	 24V DC (18V to 36V including 10% peak-to-peak max. ripple) 24V DC (as above) or 12V DC (10 to 20V including ripple), according to model type
Command signal	0 to +10V DC, or 0 to −10V DC, or −10V to +10V DC
7-pin plug connector Pin connections: A B C D E F G	 Power supply +ve Power 0V Signal 0V +ve voltage demand signal −ve voltage demand signal Monitor output Protective ground
Gain adjustment ▲	25 to 125%
Zero adjustment ▲	±18%
Factory set adjustments	Deadband, gain, dither and offset
Monitor point signal: For KAD/TG4V-3 & 5 models For all other models	 0,5V per amp solenoid current ±10V for full stroke output stage spool
Power stage PWM frequency	2 kHz nominal
Temperature range: Full performance specification Reduced performance specification ◆ Storage	 0° to +50°C (+32° to 122°F) −20° to 0°C (−4° to +32°F) −25° to +85°C (−13° to 185°F)
Reproducibility, valve-to-valve (at factory settings): Flow gain @ 100% command signal	 ≤ 5%
Protection: Electrical Mechanical	 Reverse polarity protected IEC 144 class IP65
Relative humidity	85 to 95% at 20° to 70°C (68° to 158°F)
Mass	Add 0,4 kg (0.9 lb) to mass for applicable valve

▲ *"Adjust zero" applicable to KASDG*V model only. All other valves have gain adjustment which is accurately set at the factory. Altering this setting will affect valve to valve interchangeability.*
◆ *Valve will function with reduced dynamic response.*

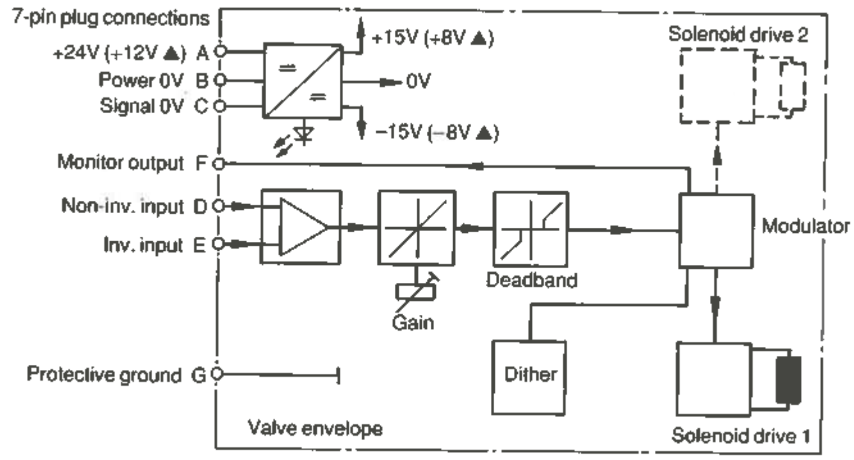
6. Performance Characteristics

Refer to GB-C-2007B for the following valve characteristics:

- Mounting interface specifications
- Max. pressures
- Coil electrical data
- Power capacity envelopes
- Flow gain
- Hysteresis
- Step input response
- Frequency response
- Fluid compatibility
- Filtration requirements

7. Electrical Block Diagrams

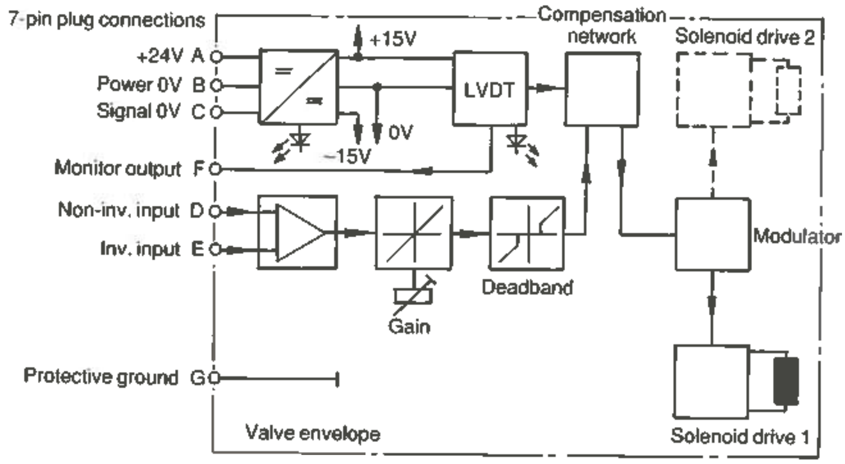
Single-stage valves without feedback
KADG4V-3 and 5
KATG4V-3 and 5



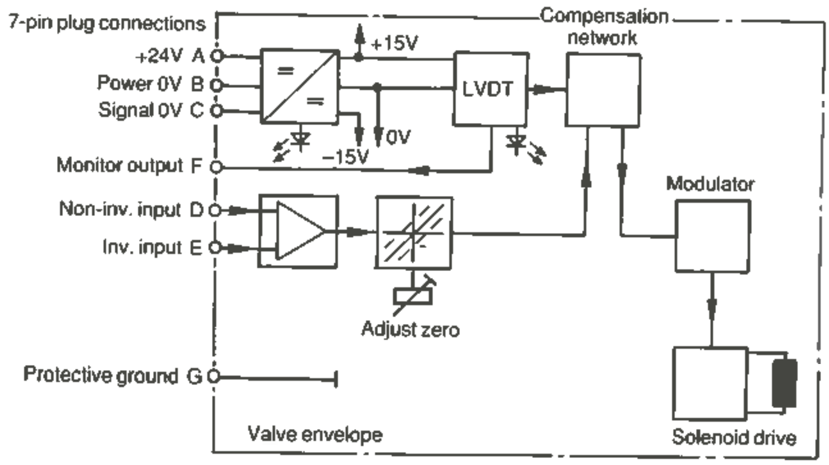
▲ *Values for 12V models, "G" in model code* d. *All other values for 24V models.*

Single-stage valves with feedback
KAFDG4V-3 and 5
KAFTG4V-3 and 5

2-stage valves with feedback from main-stage only
KAFDG5V-5, 7 and 8



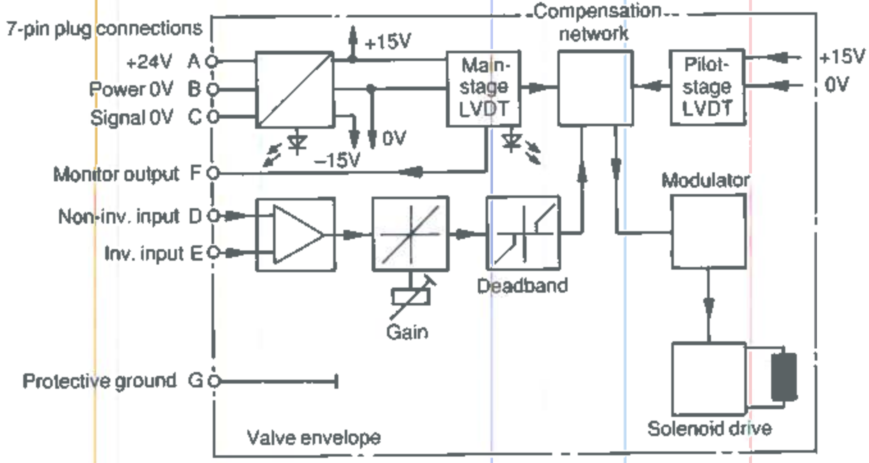
Single-stage valve for closed-loop applications
KASDG4V-3



Command Signals and Outputs

Input	Pin ref.	Signal polarity	Valve flow
Non-inverting input	D D	+ –	P–B P–A
Inverting input	E E	+ –	P–A P–B
Differential input	D & E	D > E D < E	P–B P–A

2-stage valves with feedback from pilot-stage and main-stage KAHDG5V-5, 7 and 8



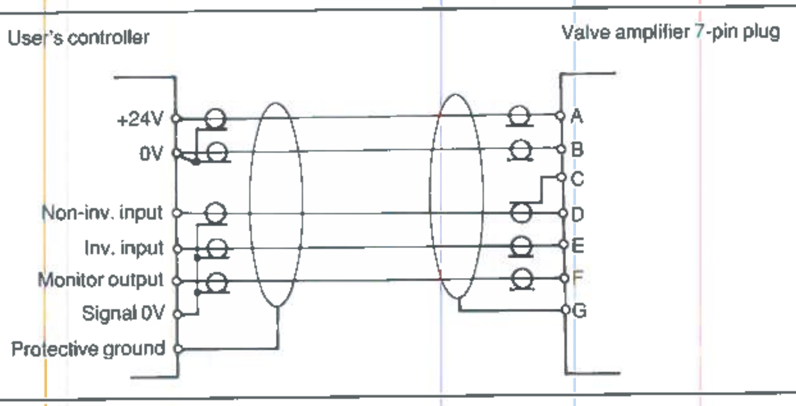
Wiring Size

Recommended wire sizes between the control system and the valve amplifier.

Power	16 x Ø 0,2 mm (16 x 0.008" dia) minimum; 3A
Signal	10 x Ø 0,1 mm (10 x 0.004" dia) minimum; 0,5A
Protective ground	Not less than as for power
Screen and shield	Each core should be screened and the cable shielded, especially on long cable runs.

A suitable cable would be 5 cores of 16/0,2 mm (16/0.008") individually screened and with overall shield.

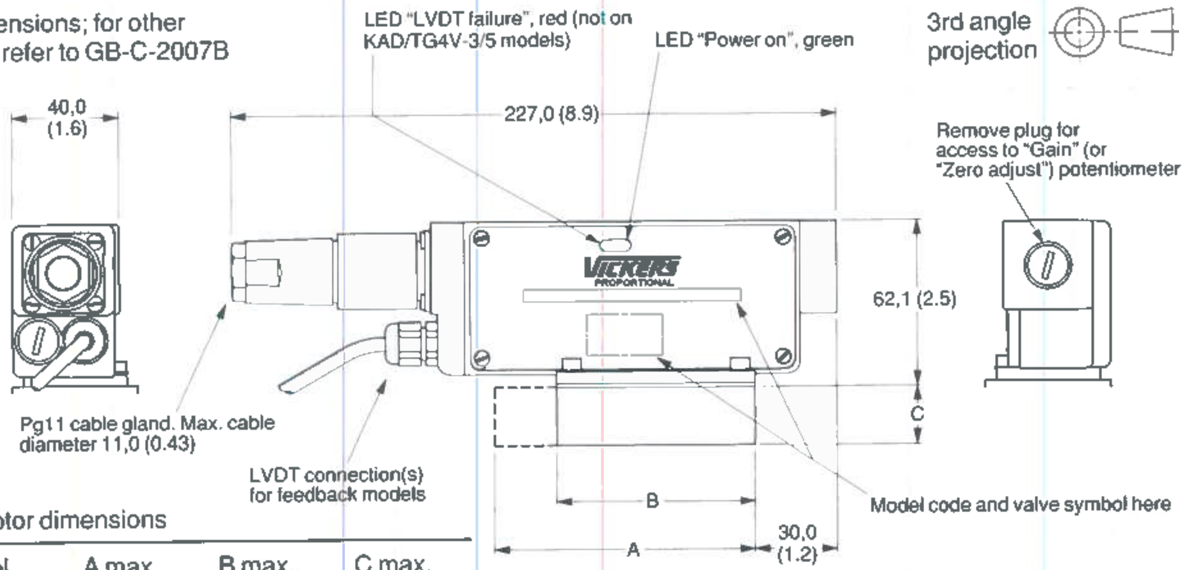
Typical Signal Arrangement



8. Installation Dimensions in mm (inches)

Amplifier housing, connector plug and wiring adaptor, all models

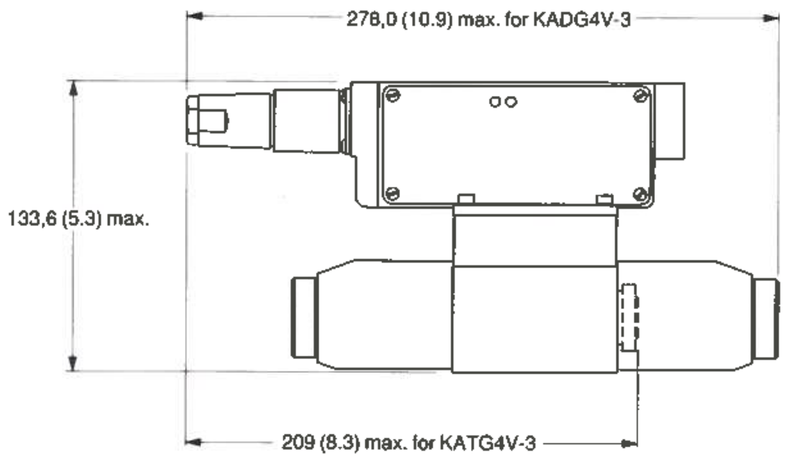
Overall dimensions; for other dimensions refer to GB-C-2007B



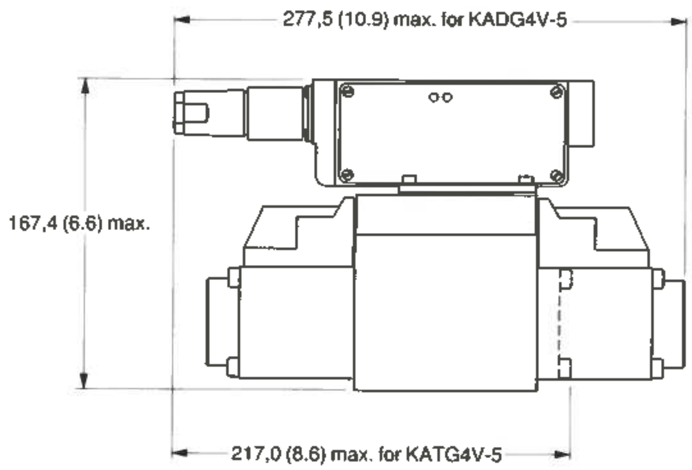
Wiring adaptor dimensions

Valve model	A max.	B max.	C max.
KA(F)*G4V-5	95,9 (3.8)	–	21,3 (0.8)
All other models	–	73,0 (2.9)	23,3 (0.9)

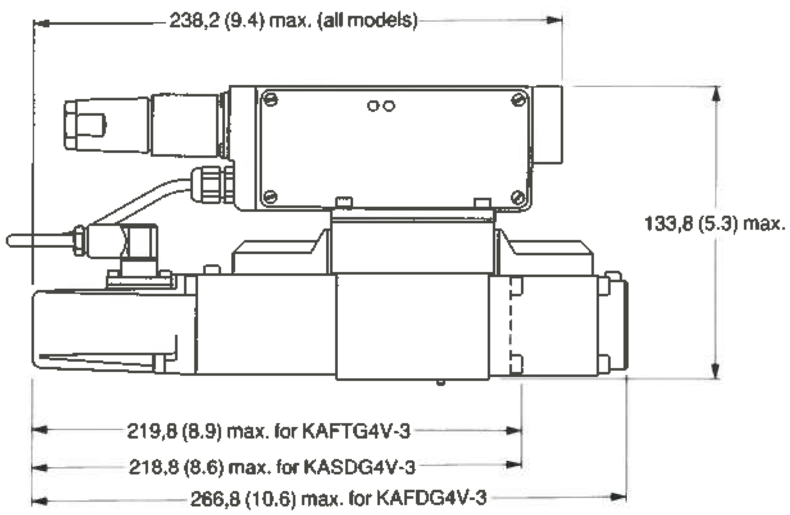
Single-stage, without feedback, size 3
KAD/TDG4V-3 models



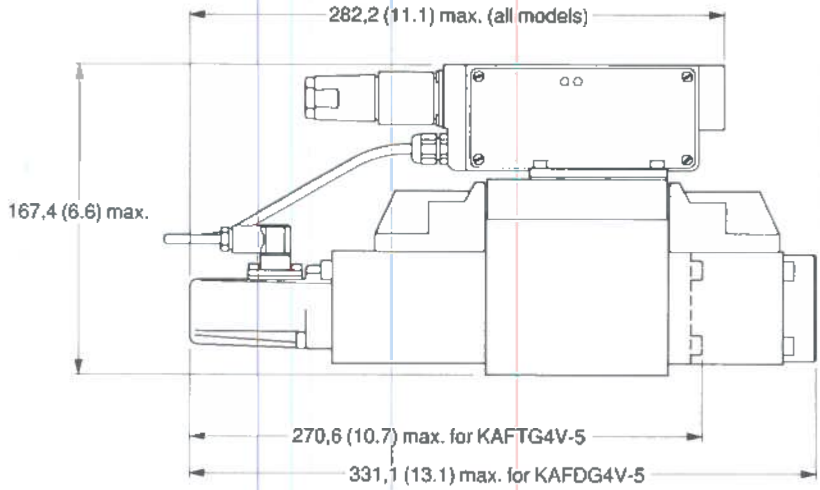
Single-stage, without feedback, size 5
KAD/TDG4V-5 models



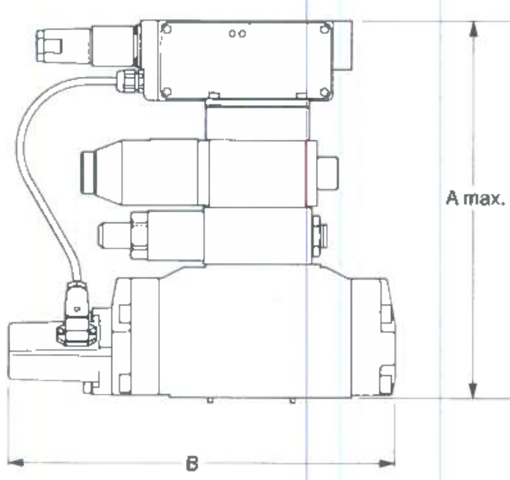
Single-stage, with feedback, size 3
KAFD/TDG4V-3 and KASDG4V-3 models



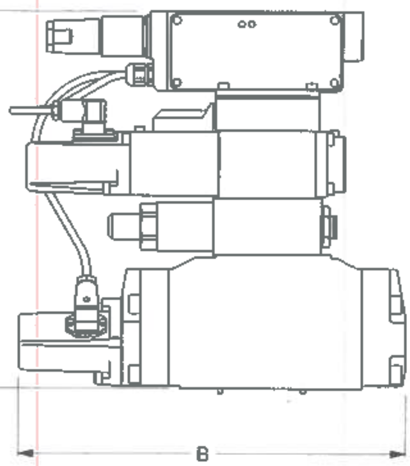
Single-stage, with feedback, size 5
KAFD/TDG4V-5 models



Two-stage models
KAFDG5V-5 models



KAHDG5V models



Dimension	Size 5	Size 7	Size 8
A	261,1 (10.3)	268,9 (10.6)	301,0 (11.9)
B	261,0 (10.28)	270,0 (10.63)	336,1 (13.24)

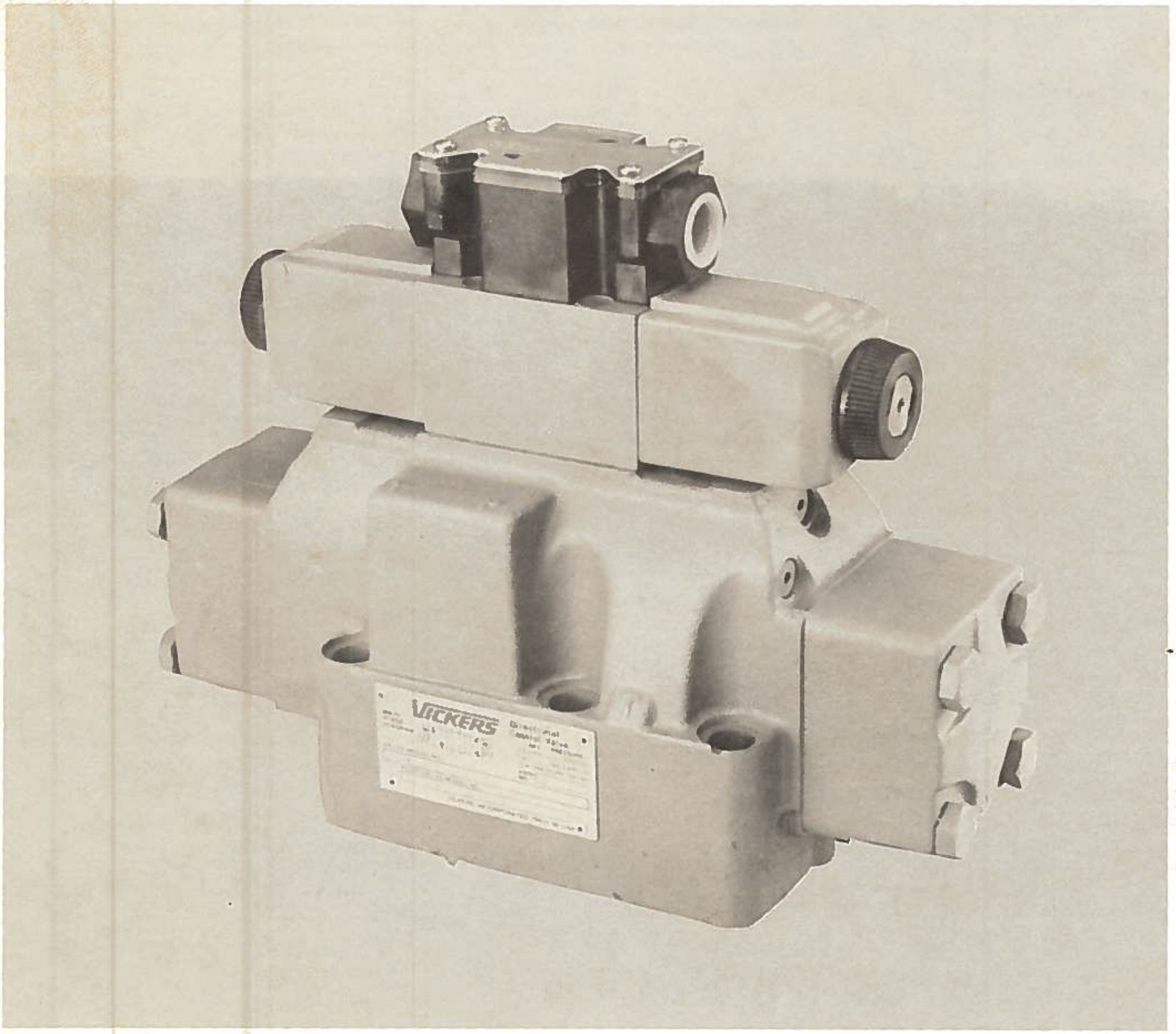
Presented by:

VICKERS
A TRINOVA Company

Service Data

Solenoid Controlled Pilot Operated Directional Valve

DG5S-H8-**(L)-(*)(X)-(*)-(E)-(T)(*)-(V)M-(S*)-*(**)**(L)-***-***-60/70



Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007-0302
U.S.A.

I-3889-S

Parts shown included in stroke ADJ. kit 941156. Order two kits if stroke ADJ. is required both ends.

471207 ADJ. Screw

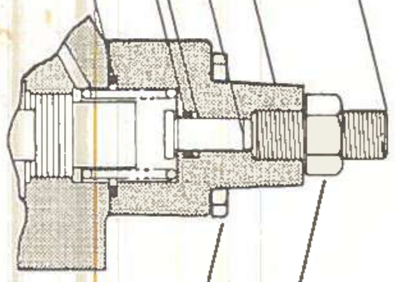
787125 Cover

223075 Piston

▲ 197573 B.U. Ring

▲ 262335 O-Ring

▲ 262403 O-Ring



470844 Screw (4 Req'd) Torque 49-59 N.m. (36-44 lb. ft.)

● 470684 Nut

MAIN STAGE SPOOL TYPE	AVAILABLE VALVE TYPE	SPOOL	MAIN STAGE ID PLATE "A" ONLY	MAIN STAGE ID PLATE B/C/F/N
O	A/B/C//N	786350	400975	400976
1		*786557		400977
2		786349		400978
3		*786558		400979
4		628162		400980
6		786559		400981
8		627221		400980
9		786561		400976
11		*786557		632700
31		*786558		580475
33		786562		400981

* SPOOL ASSEMBLY NOTE

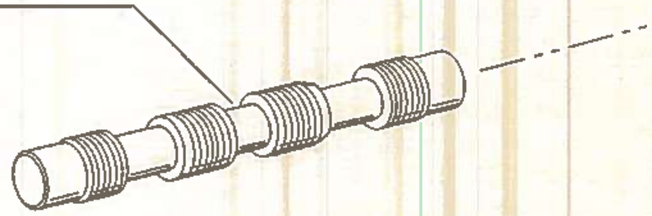
Assemble type 1 & 3 spools with narrow center land toward "A" end of valve. "A" end is defined as being closest to CYL. port "A". Type 11 & 31 spools are installed in reverse of type 1 & 3 with narrow center lands toward "B" end of valve.

VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE
DG5S-H8-*A-60	O, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3S-2A-60
DG5S-H8-*A-70		DG4V-3-2A-60
DG5S-H8-*A-60	4 & 8	DG4V-3S-28A-60
DG5S-H8-*A-70		DG4V-3-28A-60
DG5S-H8-*B-60	O, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3S-6B-60
DG5S-H8-*B-70		DG4V-3-6B-60
DG5S-H8-*B-60	4 & 8	DG4V-3S-68B-60
DG5S-H8-*B-70		DG4V-3-68B-60
DG5S-H8-*C-60	O, 1, 2, 3, 6, 9, 11, 31, 33, 52, 521	DG4V-3S-6C-60
DG5S-H8-*C-70		DG4V-3-6C-60
DG5S-H8-*C-60	4 & 8	DG4V-3S-68C-60
DG5S-H8-*C-70		DG4V-3-68C-60
DG5S-H8-*N-60	O, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3S-6N-60
DG5S-H8-*N-70		DG4V-3-6N-60
DG5S-H8-*N-60	4 & 8	DG4V-3S-68N-60
DG5S-H8-*N-70		DG4V-3-68N-60

See pilot valve service drawing for parts breakdown

■ PLUG	TORQUES (OILED) N.m.	TORQUES (OILED) lb. in.
113000 237588	5.0-5.9	45-52
343740	15.0-16.0	133-142
398071	9.8-10.2	87-90
407533	12.1-12.4	107-110

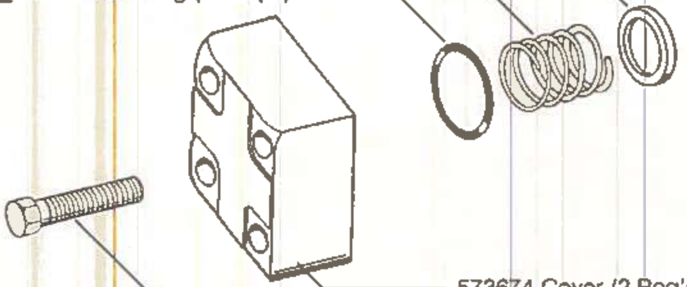
Spool (see table)



786523 Washer (2 Req'd) Omit spring offset pilot models

783665 Spring (2 Req'd) Omit spring offset pilot models

▲ 262403 O-Ring (2 Req'd)



573674 Cover (2 Req'd)

□ 470844 Screw (8 Req'd) Torque 49-59 N.m. (36-44 lb. ft.)

▲ Included In F3 Seal Kit 696895
★ Included In Plug Kit 941167
□ Included In Fastener Kit 941175
◆ Not Available For Sale
♠ Used On Check Valve Models Only
■ Plug Torques (See Table)
● Available Only In Kit Of 25 Each

PILOT STAGE BOLT KIT (INCLUDES 4 ATTACHING BOLTS)	
MODEL	BOLT KIT
W/O Pilot choke	696892
W/ Pilot choke	696893

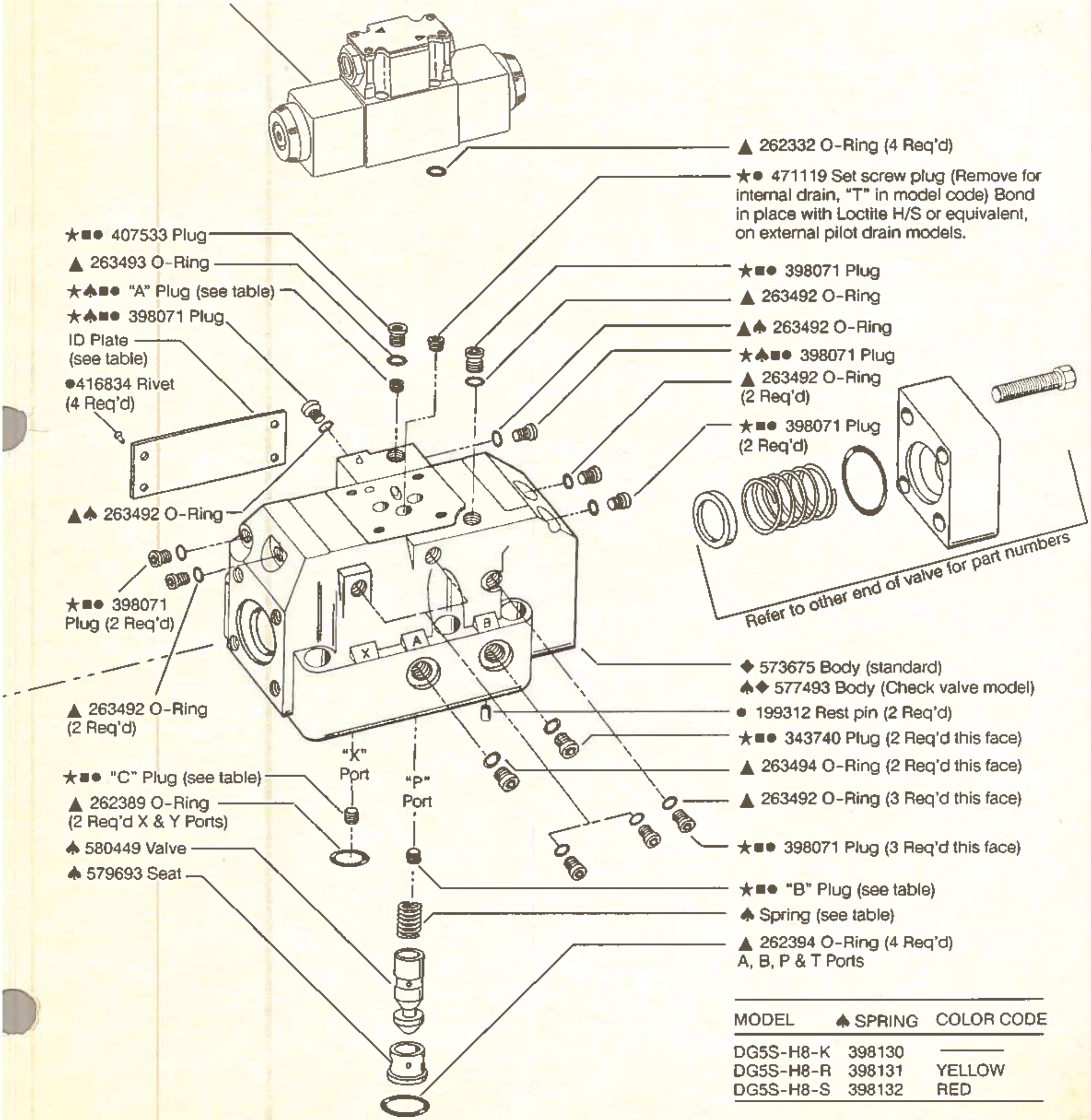
Torque 4.5-5.7 N. m. (39.8-50.4 lb. in.)

See pilot choke service drawing for parts breakdown

■ PLUG INSTALLATION TABLE			
MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S-H8-**	DOES NOT EXIST	237588	——
DG5S-H8-**-E	DOES NOT EXIST	113000	237588
DG5S-H8-**-X	DOES NOT EXIST	——	——
DG5S-H8-**-X-E	DOES NOT EXIST	113000	——
DG5S-H8-**-KRS	237588	DOES NOT EXIST	——
DG5S-H8-**-E-KRS	113000	DOES NOT EXIST	237588
DG5S-H8-**-X-KRS	——	DOES NOT EXIST	——
DG5S-H8-**-X-E-KRS	113000	DOES NOT EXIST	——

★ 113000 Solid plug ★ 237588 Orifice plug

This solenoid removed on right hand A & B models. Refer to service drawings for more detailed information on left hand valves.



MODEL	♠ SPRING	COLOR CODE
DG5S-H8-K	398130	——
DG5S-H8-R	398131	YELLOW
DG5S-H8-S	398132	RED

(F3) - CVC - ** - ** - ** - **** - 10 - (*) - (N*) - (****)

1 2 3 4 5 6 7 8 9 10 11

1 Special Seals

Seals for mineral oil & fire resistant fluids.

2 Cartridge Valve Cover

3 Cartridge Valve Size (mm)

16, 25, 32, 40, 50, 63

4 Function

Directional Valve
N,D1,PC,W,W11,
W21,W31,A,AD1

Pressure Relief
C,C1,U,U1

Pressure Reducing
X,X1

5 Plugs, Seals, Bolts

Plugs B - BSP Thd. (Europe)
S - SAE Thd. (USA)

Seals 1 - DIN 3770 (Europe)
2 - ISO 3601 (Europe & USA)

Bolts 9 - Metric (Europe)
Blank - Without bolts (USA)

6 Adjuster Mechanism

(A,AD1,C,C1,U,U1,X,X1 Only)
M - Micrometer Knob
K - Micrometer Knob with key lock
W - Rod with lock nut

7 Adjuster Presure Range

(A,AD1,C,C1,U,U1,X,X1 Only)
125 3 - 125 bar (44-1800 psi)
245 5 - 245 bar (72-3550 psi)
350 8 - 350 bar (116-5000 psi)

8 Design

9 Model Suffix

For special features

10 -AD1 Function

(Omit for other cover types)

NC - Normally Closed
NO - Normally Open

11 Orifice Location/Size*

(Omit if not required)

X08 - 0.8mm orifice @ 'X' port
Z112 - 1.2mm orifice @ 'Z1' port
AP99 - No orifice in 'AP' port
Z200 - Solid plug @ 'Z2' port

* Orifices may be removed or added to the cartridge valve cover to fine tune the system. If the model code on the cover nameplate has a letter/number code after the design, orifices are installed into specific port locations, different from the standard assembly. Example: -10-X08 indicates an 0.8mm orifice is installed into the 'X' port, within the cover. Orifices may be installed in the 'X', 'Z1', 'Z2', 'P', 'A', 'B' and 'AP' port, depending on cover type and application. Refer to the Appendix for standard orifice locations and sizes for each cartridge valve cover.

Table 1. Model Code for Cartridge Valve Cover (CVC)

(F3) - CVI - ** - *** - 2 - * - ** - (*) - (**)

1 2 3 4 5 6 7 8 9

1 Special Seals

Seals for mineral oil & fire resistant fluids.

2 Cartridge Valve Insert

3 Cartridge Valve Size (mm)

4 * Function

D10 (1:1)	C,C1
D11 (1:1.1)	N
D11 with orifice	U,U1
D20 (1:2)	D1,D2,N,PC,W, W11,W21,W31
F (1:2)	A,AD1
R (1:2)	N,D1,D2
X1	X,X1

5 Seals

1 – DIN 3770 (Europe)

2 – ISO 3601 (Europe & USA)

6 Spring Cracking Pressure bar (psi)

Type	L	M	H
D10	Blank	Blank	2.0(30)
D11	0.3(4)	1.4(20)	2.7(39)
D20	0.5(7)	2.5(36)	5.0(72)
F	0.5(7)	2.5(36)	5.0(72)
R	0.5(7)	2.5(36)	5.0(72)

Blank – No letter code used.

7 Design

Valve Size (mm)						Function
16	25	32	40	50	63	
-11	-30	-11	-30	-10	-10	D10
-10	-10	-10	-10	-10		D11/D20/F/R
-10	-10					X1

8 Model Suffix

For special features

9 Orifice 'AX'

(D11 with orifice only)

08 – 0.8mm	16 – 1.6mm
10 – 1.0mm	18 – 1.8mm
12 – 1.2mm	20 – 2.0mm
14 – 1.4mm	

* – Most common insert/cover combinations

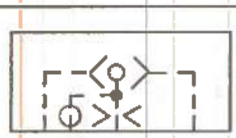
Table 1a. Model Code for Cartridge Valve Insert (CVI)

Cartridge Valve Type	Installation Drawing	Parts Drawing
Directional	GB-V-1501	S-F-40556
Pilot Operated Check	GB-V-1501	S-F-40557
Shuttle	GB-V-1501	S-F-40557
Pressure Relief	GB-V-1502	S-F-40558
Pressure Reducing	GB-V-1503	S-F-40559

Table 2. European Service Drawings for CVU Cartridge Valves

SECTION II – DIRECTIONAL COVERS

The function of the directional cover assembly is to direct flow from one port to another. Seven types of directional covers are available. The type of directional cover used depends upon application requirements. The seven types of directional covers and their respective functional symbols are listed below.

Cover Type	Functional Symbol	Size (mm)
N Directional		16, 25, 32, 40, 50, 63
A Directional with Stroke Adjuster		16, 25, 32, 40, 50, 63
D1/D2 Directional with NFPA-D03/D05 Pilot Interface (D1 Function Shown)		16, 25, 32, 40 (D1 Function) 50, 63 (D2 Function)
AD1 Directional with NFPA-D03 Pilot Interface & Stroke Adjuster		25, 40
W Shuttle		16, 25, 32, 40
W11/W21/W31 Shuttle with NFPA-D03 Pilot Interface (W11 Shown)		16, 25, 32, 40
PC Pilot Operated Check		16, 25, 32, 40

A. Directional (N Function)

This directional cover assembly is available in **16, 25, 32, 40, 50** and **63mm** size. The directional cover assembly (shown in Figure 3) contains a pilot pressure passage with an orifice to control the opening and closing rate of the poppet that is located within the cartridge insert. The poppet is controlled by an externally operated pressure source. With sufficient pressure at pilot port 'X', the poppet is closed and flow between 'A' and 'B' port is blocked. The poppet moves upward and flow is from port 'A' to port 'B' when the 'X' port is drained to tank. The amount of pressure required to move the poppet depends upon the insert area ratio and the spring force. Flow is created from 'B' port to 'A' port when the 'X' port is connected to tank and pressure at 'B' port exceeds the pressure at 'A' port plus the equivalent pressure of the spring force. The standard directional cover operation is shown in Figure 3a.

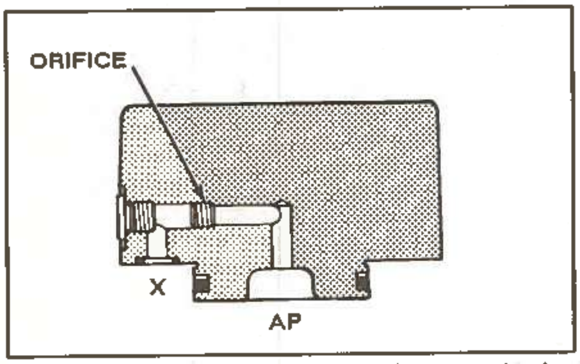


Figure 3. Directional Cover (N Function)

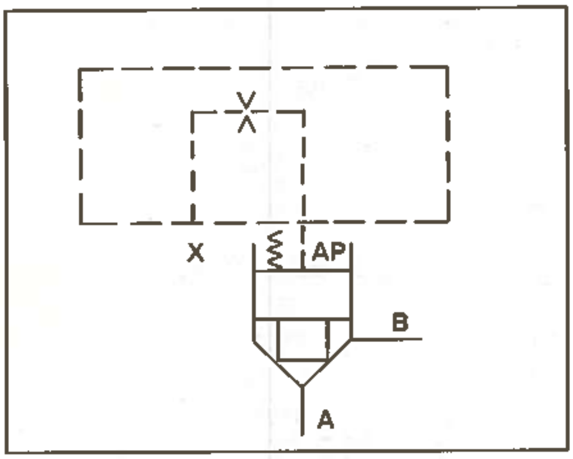


Figure 3a. Directional Cover Operation

B. Directional with Stroke Adjuster (A Function)

This cover assembly is available in **16, 25, 32, 40, 50**, and **63mm** size. The cover assembly provides directional control and flow regulation in a single unit. Flow regulation is obtained by limiting the travel or stroke of the insert poppet. The throttle opening is set by the position of a rod which extends into the cartridge insert spring chamber. The rod forms a stop to prevent the poppet from fully opening.

Three types of adjustments are available – locknut (W), the micrometer (M), and micrometer with key lock (K). Refer to Figure 4 for the basic locknut adjustment (W) arrangement. The micrometer adjuster provides precise control with the capability of returning to a previous pressure setting when desired. The three adjuster types are described in more detail in Section VII.

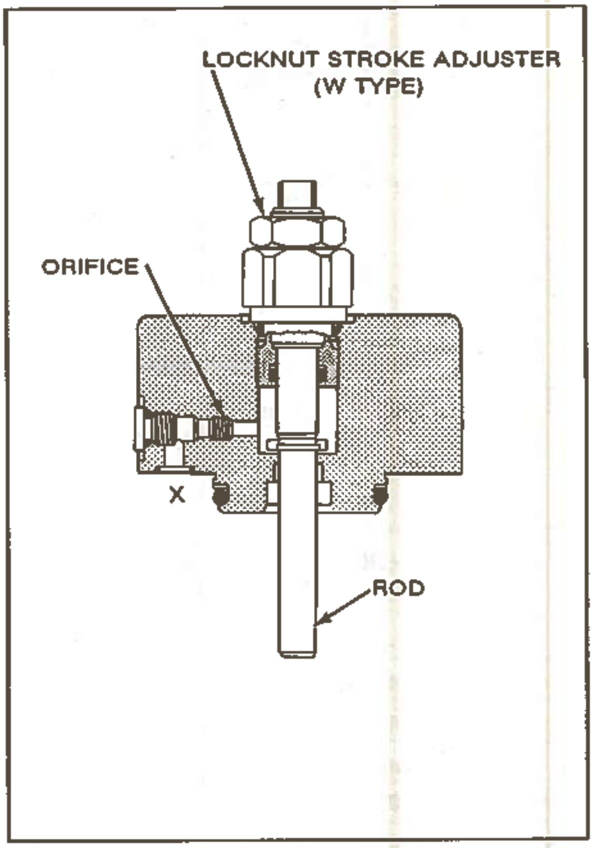


Figure 4. Directional Cover with Stroke Adjuster (A Function)

C. Directional with NFPA-D03/D05 Pilot Interface (D1 & D2 Function)

This type of cover assembly is available in 16, 25, 32, 40, 50 and 63mm size. The 16, 25, 32 and 40mm covers have a NFPA-D03 interface for mounting a DG4V-3 pilot valve. See Figure 5. The 50mm and 63mm covers have a NFPA-D05 interface for mounting a DG4S4-01 pilot valve. See Figure 5a. Refer to Table 3 for pilot valve information. The difference between the two cover sizes is the interface porting relationship to ports 'Z1' and 'Z2'. The integrally mounted pilot valve provides a compact, convenient package for pressure source switching to control the opening and closing of the insert poppet.

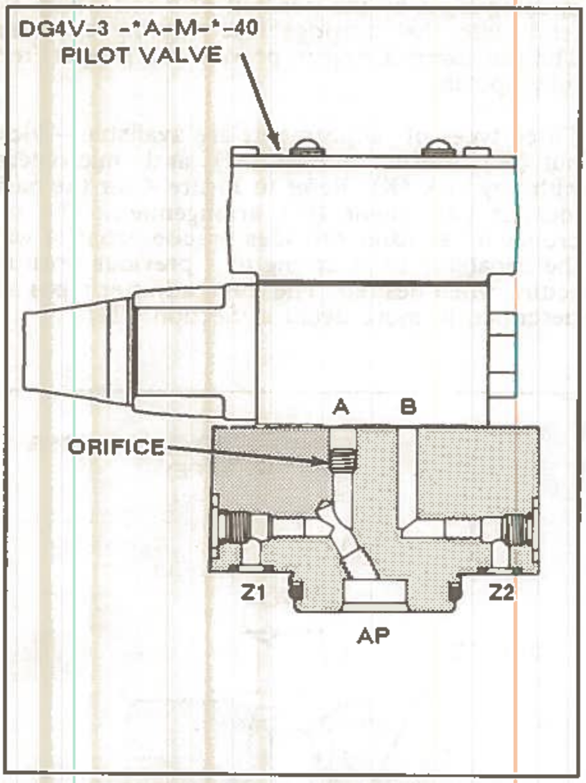


Figure 5. Directional Cover with ISO-4401-03/NFPA-D03 Pilot Interface (Formerly NFPA-D01) 'D1' Function

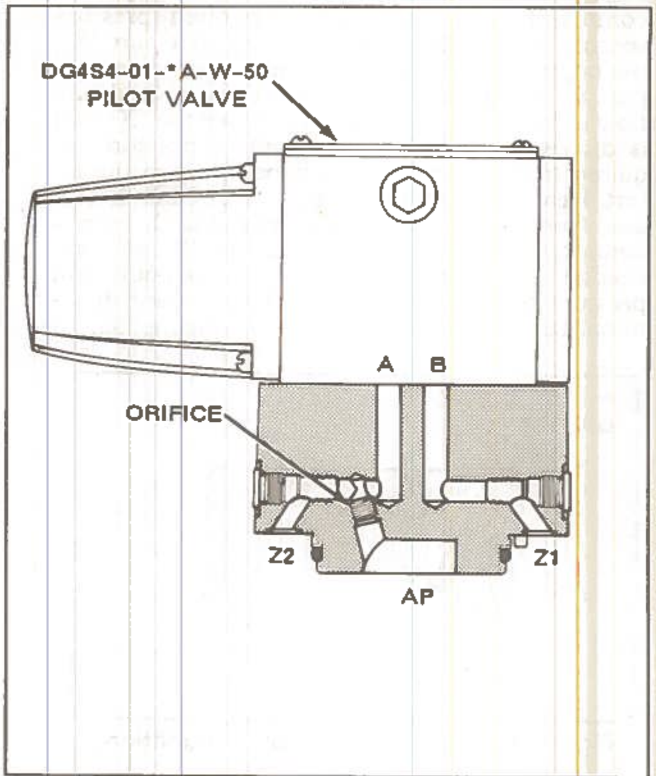


Figure 5a. Directional Cover with ISO-4401-05/NFPA-D05 Pilot Interface (Formerly NFPA-D02) 'D2' Function

NFPA-D03 INTERFACE			NFPA-D05 INTERFACE		
Model	Parts Drawing	Installation Drawing	Model	Parts Drawing	Installation Drawing
DG4V-3-*A-40	I-3861-S	517351	DG4S4-01-*A-W-50	I-3557-S	517410
DG4V-3-*B-40	I-3862-S		DG4S4-01-*B/C-W-50	I-3558-S	
DG4V-3-*C-40	I-3863-S		DG4S4-01-*N-W-50	I-3559-S	
DG4V-3-*F-40	I-3864-S		DG4S4-01-*A-50	I-3478-S	517401
DG4V-3-*N-40	I-3865-S		DG4S4-01-*C-50	I-3477-S	
			DG4S4-01-*N-51	I-3471-S	

Table 3. Pilot Valve Information

D. Directional Cover with NFPA-D03 Pilot Interface and Stroke Adjuster (AD1 Function))

This type of cover combines the pilot interface and stroke adjuster feature. The pilot valve switches pressure to or from the 'AP' port to open or close the poppet. The flow is then regulated by the stroke adjuster to a desired flow rate. This type of cover combination is only available in the 25 and 40mm valve size. With the pilot valve de-energized, the insert poppet is normally open when a solid plug is installed at the 'A' port and an orifice plug is installed at the 'B' port of the cover (interface location).The insert poppet is normally closed when the solid plug and orifice plug location is reversed (ie. orifice plug installed at 'A' port and a solid plug installed at 'B' port). Figure 6 illustrates the AD1 cover mounted to a DG4V-3 pilot valve. Figure 6a shows the AD1 cover operation.

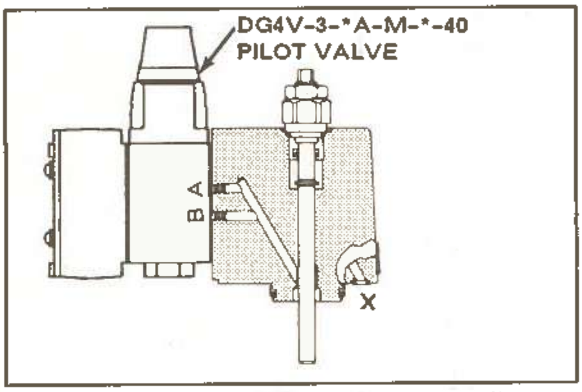


Figure 6. Directional Cover with Pilot Interface & Stroke Adjuster (AD1 Function)

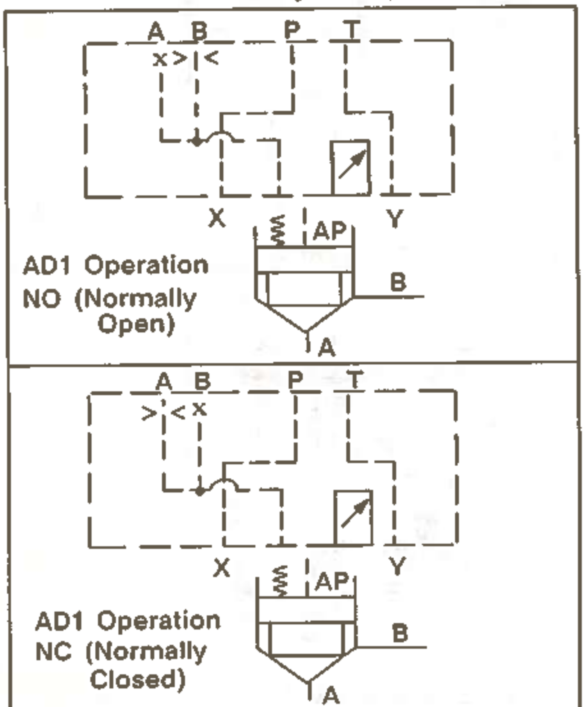


Figure 6a. AD1 Cover Operation

E. Shuttle (W Function)

This shuttle cover assembly is available in the 16, 25, 32 and 40mm size. The shuttle cover will take the higher of two pressures and direct it into the pilot spring area (AP) of the cartridge valve insert. Orifices are available in the cover to control reaction time of the poppet. A seat is pressed into the cover bore and a ball is inserted. The outer plug is then installed into the cover. The outer plug retains the ball and seat between the spring area (AP) and the 'Y' port. The outer plug also has an o-ring and back-up ring to prevent leakage between the (AP) and 'Y' port areas. Figure 7 shows the construction of a shuttle cover (W function) assembly. The shuttle valve operation is illustrated in Figure 7a.

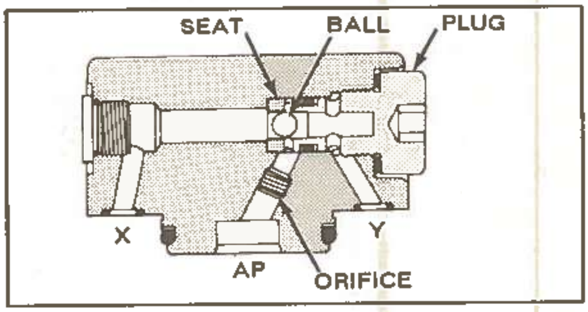


Figure 7. Shuttle Cover Assembly (W Function)

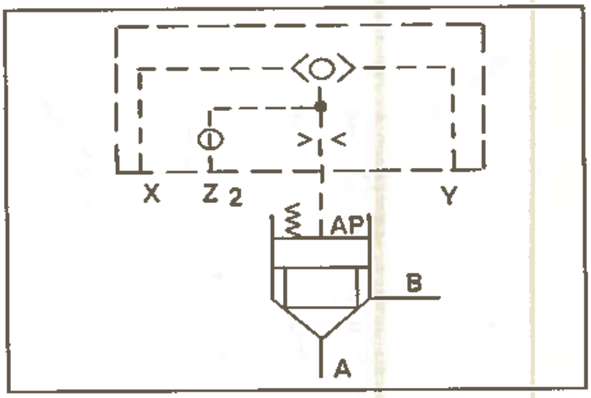


Figure 7a. Shuttle Valve Operation (W Function)

F. Shuttle / NFPA-D03 Pilot Interface (W11, W21 & W31 Function)

Shuttle covers that have the NFPA-D03 pilot interface are available in the 16, 25, 32 and 40mm sizes. Pilot interface shuttle covers have three configurations: type W11, W21 and W31.

In the W11 cover, when the pilot valve solenoid is de-energized, the cartridge is shut by the higher of the pressures at 'X' or 'Y'. Pilot port 'Z2' can be used to simultaneously pilot a second cartridge.

In the W21 cover, when the solenoid is de-energized, the cartridge is shut by the higher of the pressures 'X' or 'Y'. Type W21 differs from W11 in that port 'Z2' senses pressure between the shuttle and the 'P' port of the DG4V-3. It is inde-

pendent of the energizing or de-energizing of the DG4V-3.

Type W11 and W21 use the same cover, however, the difference between the two is the external porting, which accesses 'Z2'.

In the 16mm size (W11 Function), the solid plug is located behind the top SAE plug. In the 25, 32 and 40mm size (W11 Function), the solid plug is located behind the bottom SAE plug.

In the 16mm size (W21 Function), the solid plug is located behind the bottom SAE plug. In the 25, 32 and 40mm size (W21 Function), the solid plug is located behind the top SAE plug.

Type W31 cover is completely different. Its function is to provide a non-reverse flow check, eliminating the need for a separate back flow check. This is achieved by the installation of a solid plug in the 'B' port and an orifice in the 'A' port of the interface.

Figure 8 illustrates the three types of shuttle cover configurations and their respective plug locations. Refer to Figure 23 and 23a for parts breakdown. Refer to Table 3 for pilot valve drawings.

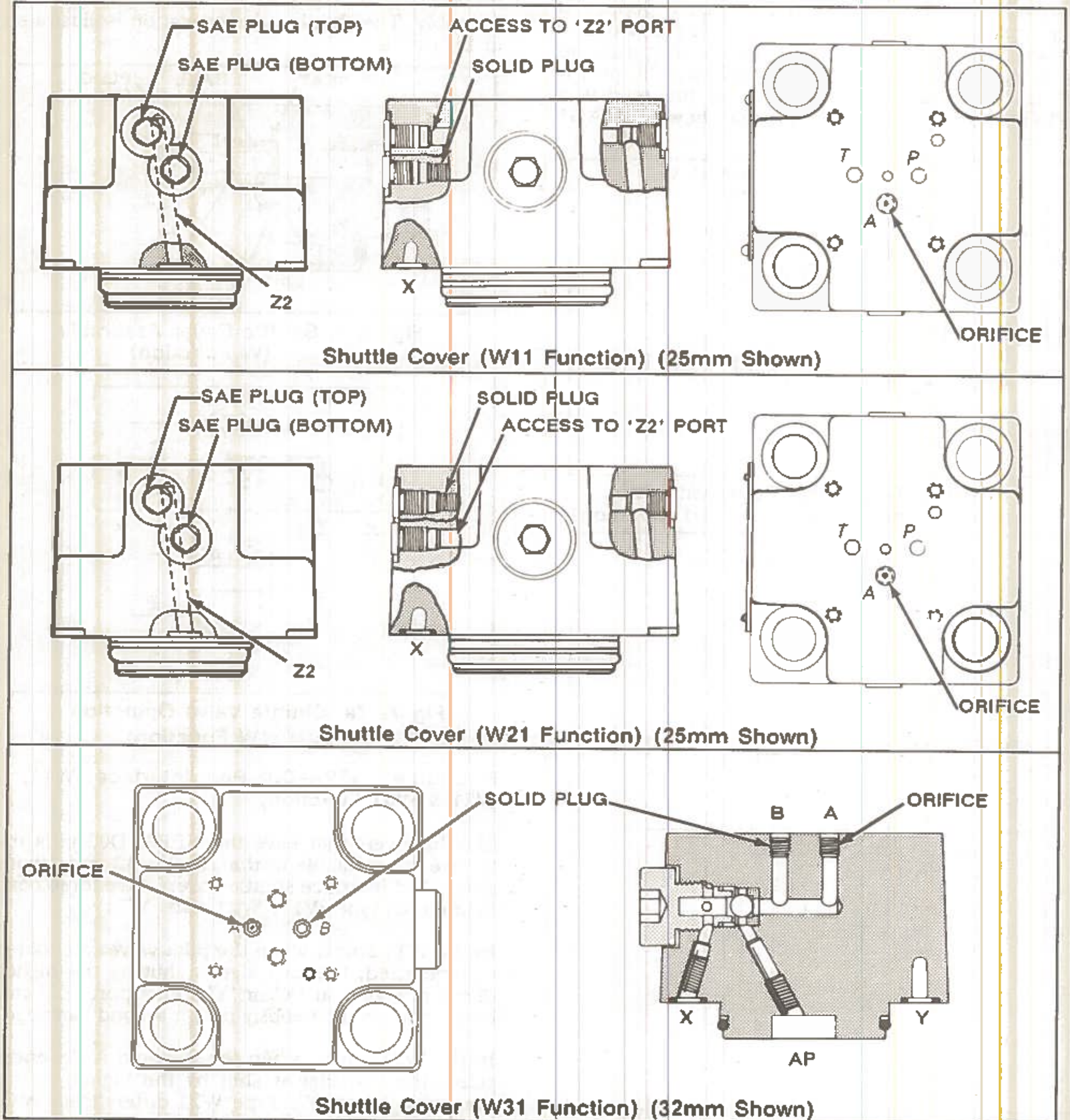


Figure 8. Shuttle Cover Construction (NFPA-D03 Pilot Interface) (W11, W21, W31 Function)

Figure 8a illustrates the operation of the shuttle valve for the W11, W21 and W31 functions.

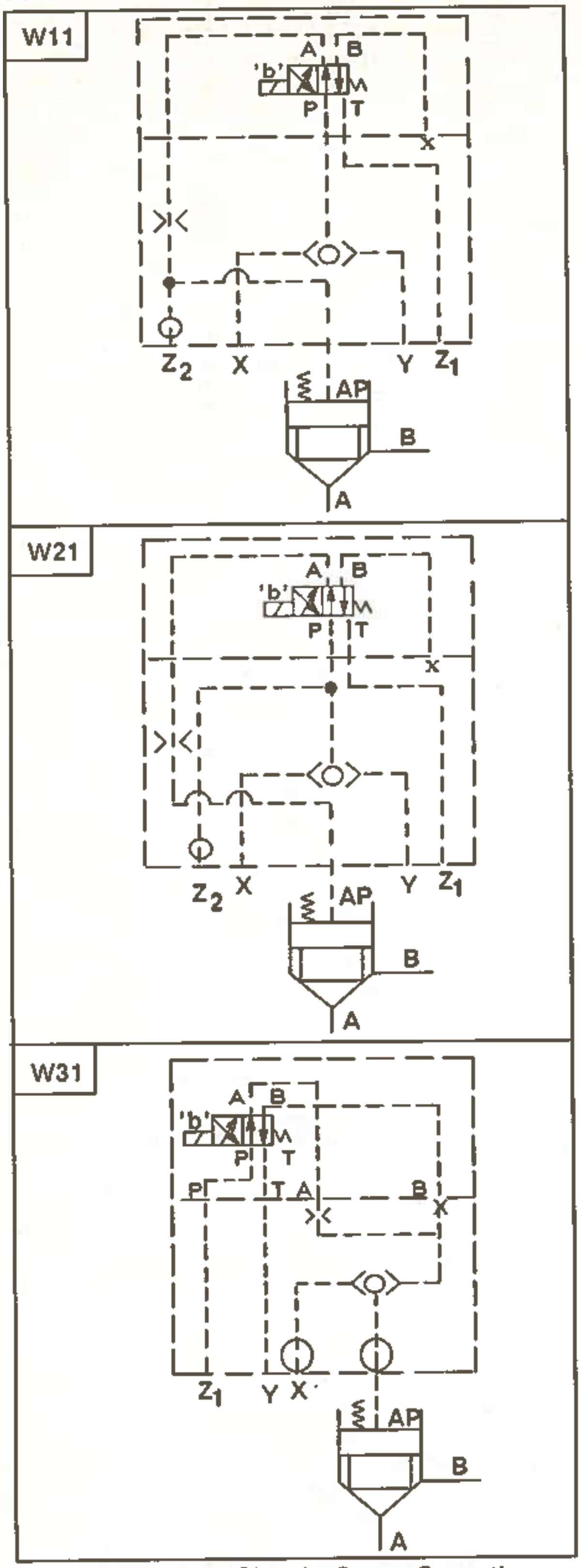


Figure 8a. Shuttle Cover Operation (W11, W21 and W31 Functions)

G. Pilot Operated Check (PC Function)

The pilot operated check cover assembly is available in the 16, 25, 32 and 40mm size. Figure 9 shows the construction of a pilot operated check cover. Three pilot ports are used:

- -The 'X' port is drilled in the manifold block to the pilot signal.
- -The 'Y' port is drilled in the manifold block to connect with the 'B' port of the insert.
- -The 'Z1'port is normally connected to a drain line or tank port.

A simple check valve is created when there is no signal at the 'X' port. Flow can pass from 'A' to 'B' if the pressure in the 'A' port is greater than the pressure in the 'B' port plus the spring force. Flow is blocked from 'B' to 'A'. See Figure 9a.

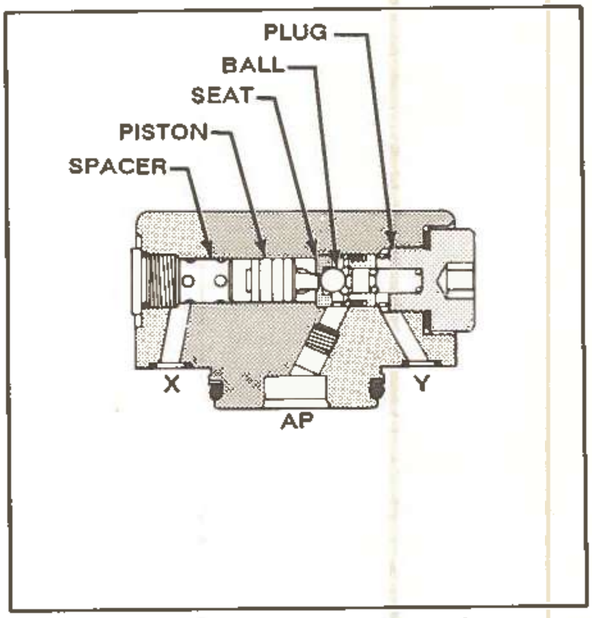


Figure 9. Pilot Operated Check Cover (PC Function)

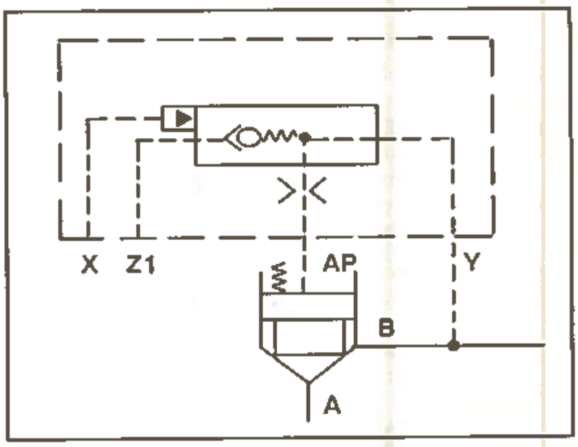
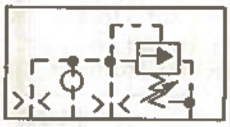
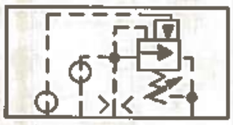
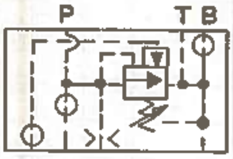


Figure 9a. Pilot Operated Check Operation

SECTION III - PRESSURE RELIEF COVERS

The pressure relief cover assembly is used to limit system pressure to a desired pressure setting. The pressure setting is determined by the cover spring force and the adjuster mechanism position. Pressure relief covers are available in the 16, 25, 32 and 40mm size. Four types of pressure relief covers are available. The pressure relief covers and their respective functions and sizes are listed below.

Cover Type	Functional Symbol	Size (mm)
C Pressure Relief		16,25, 32,40
C1 Pressure Relief with NFPA-D03 Pilot Interface		16,25, 32,40
U Unloading		16,25, 32,40
U1 Unloading with NFPA-D03 Pilot Interface		16,25, 32,40

A. Pressure Relief (C Function)

This pressure relief cover assembly is available in the 16, 25, 32, and 40mm size. The cover assembly (shown in Figure 10) consists of a seat, piston, spring, orifice plugs, seals, and a pressure adjuster mechanism. The adjuster mechanism may be the basic locknut, the micrometer , or the micrometer with keylock type.

Figure 10a illustrates the operation of the pressure relief valve. The orifice plug at the (AP) area dampens the reaction time of the insert poppet and prevents instability. When system pressure at the 'A' port area exceeds the pressure at the (AP) area, the insert poppet lifts off its seat and allows flow from 'A' port to 'B' port (tank). This relieves system pressure at the 'A' port.

Venting the valve by opening 'Z1' to tank will permit flow to occur from 'A' to 'B' at low pressure. Vent pressure will be equivalent to the spring force on the cartridge poppet plus any back pressure present in the vent line. The 'AP' area is connected internally within the cover to the 'Z1' port.

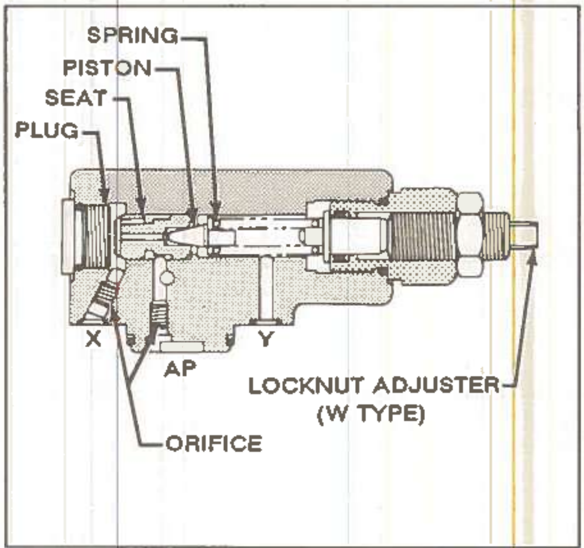


Figure 10. Pressure Relief Cover (C Function)

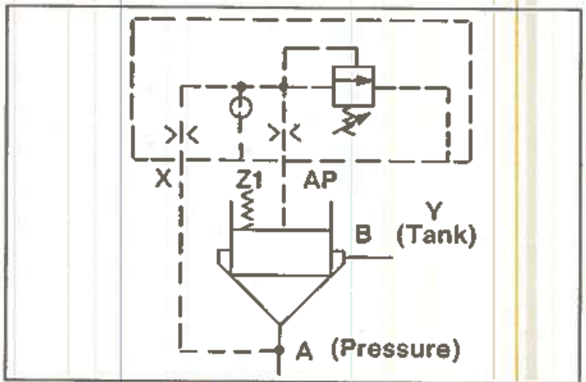


Figure 10a. Pressure Relief Operation

B. Pressure Relief Cover with NFPA-D03 Pilot Interface (C1 Function)

This cover assembly (shown in Figure 11) is available in the 16, 25, 32, and 40mm size and is used for mounting a pilot valve such as **DG4V-3-**-40** or **CGE-02-**-22.** The cover functions like the standard relief except the pressure from 'A' is either blocked or directed to tank by the pilot valve. See Figure 11a. When the pilot valve solenoid is de-energized, the relief valve is vented to tank. The relief valve operates at its relief valve pressure setting, when the pilot valve solenoid is energized. The 'Z1' port is a remote vent connection. Block the 'Z1' port if the remote vent feature is not used.

NOTE

If a CGE-02 pilot valve is used, install a solid plug into the top of relief valve cover at the 'B' port location to avoid external leakage. See Table 10 for orifice kits. Refer to parts drawing I-3695-S and installation drawing 519205 for CGE-02 applications.

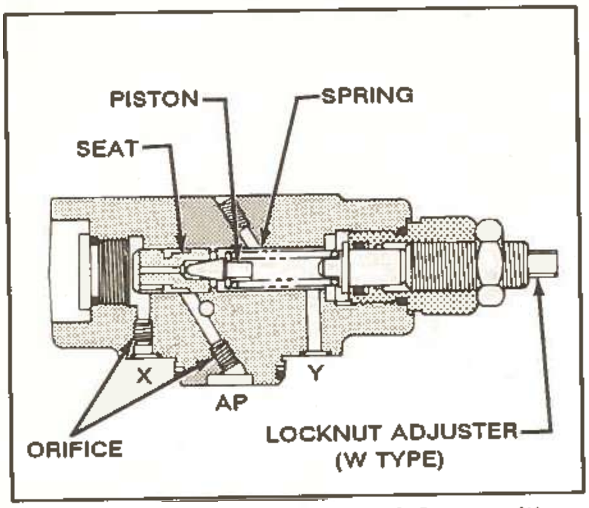


Figure 11. Pressure Relief Cover with Pilot Interface (C1 Function)

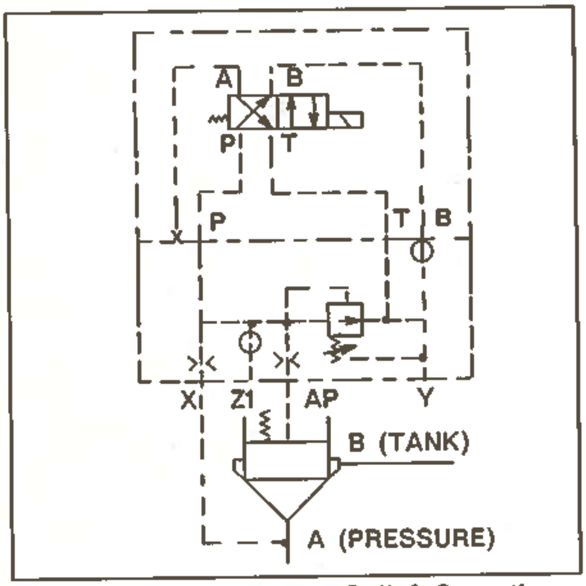


Figure 11a. Pressure Relief Operation with Pilot Interface

A pressure relief module (CVGC-3-*-**-10) may be installed between the pilot valve and the relief valve cover on 16, 25, 32 and 40mm cartridge valves. The CVGC-3 module is used on applications that require both a low and high pressure relief setting. Figure 11b illustrates a cartridge valve arrangement with the pressure relief module. Refer to Table 4 for the pressure relief module model code breakdown. In all applications, the highest pressure setting is controlled by the cover and the lower pressure setting is controlled by the CVGC -3 module.

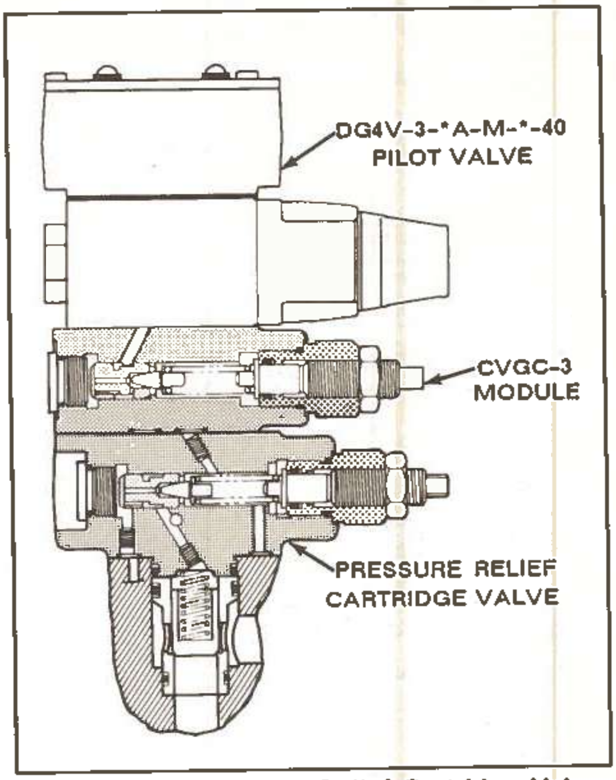


Figure 11b. Pressure Relief Cartridge Valve with Pressure Relief Module for Dual Pressure Control

CVGC-3-*-***-10

- Pressure Relief Module
- ISO-4401-03 (NFPA-D03) Interface
- Adjuster type
  - W – Locknut
  - M – Micrometer
  - K – Micrometer & keylock
- Pressure Range
  - 125 – 43-1800 psi
  - 245 – 72-3550 psi
  - 350 – 116-5000 psi
- Design

CVGC-3-*-***-10 available for use with C1, X1 and U1 covers only.

Note: 14.5 psi = 1 bar

Table 4. Model Code for Pressure Relief Module

C. Unloading (U Function)

This type of cover assembly is similar to the pressure relief cover. Available sizes are 16, 25, 32 and 40mm. The valve is unloaded when the pressure at the 'X' port reaches 85% of the the relief pressure setting. The 'X' port is independent of the other ports. Venting is controlled through the 'Z1' port. System pressure is sensed through the 'AX' orifice in the insert poppet. Figure 12 shows the construction of the unloading cover. Figure 12a illustrates the unloading valve operation.

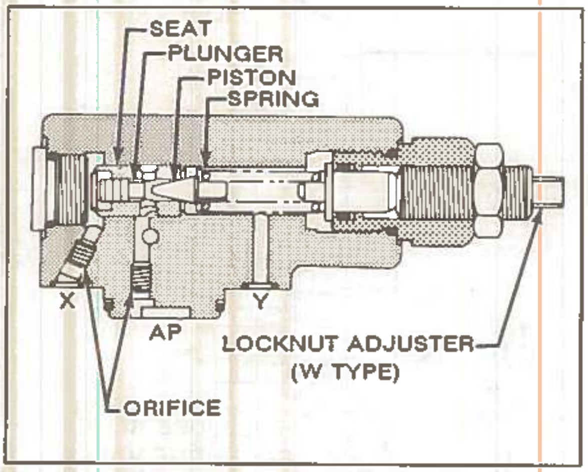


Figure 12. Unloading Cover (U Function)

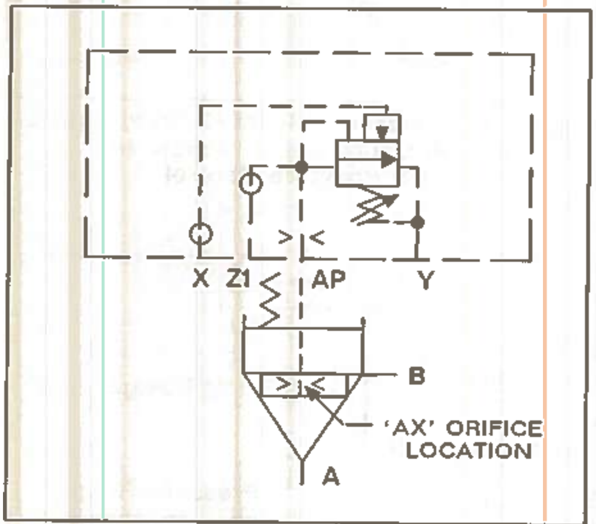


Figure 12a. Unloading Valve Operation

D. Unloading with NFPA-D03 Pilot Interface (U1 Function)

This type of cover assembly is available in the 16, 25, 32 and 40mm size. When the pilot valve solenoid is energized, system pressure is at the maximum level set by the adjuster on the cartridge cover. The unloading function is controlled through the 'X' port. System pressure is vented to tank when the pilot valve solenoid is de-energized. Figure 13 shows the construction of the cover assembly. Figure 13a illustrates the unloading operation with a pilot valve. Note that the insert poppet has an 'AX' orifice.

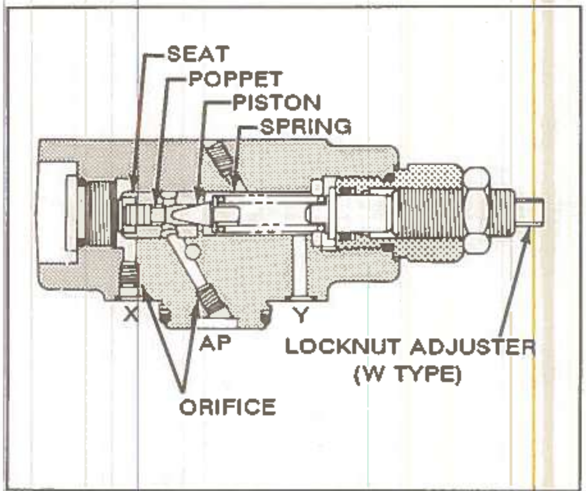


Figure 13. Unloading Cover with NFPA-D03 Interface (U1 Function)

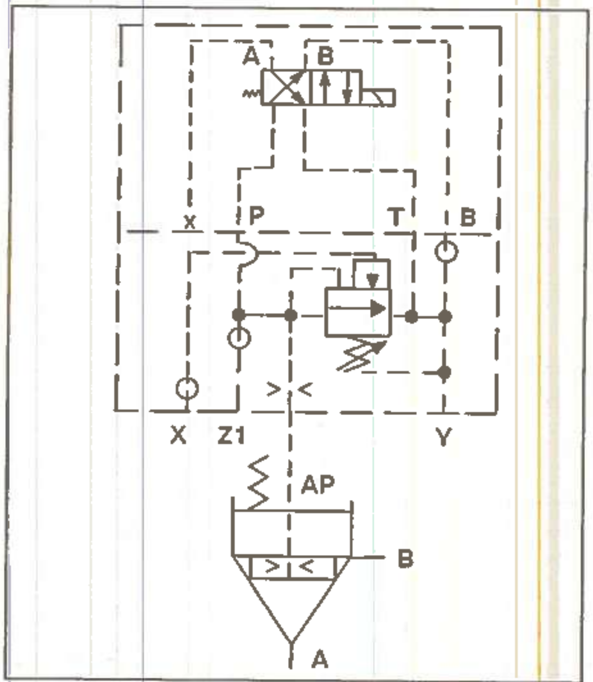
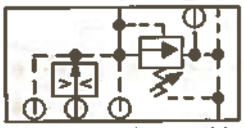


Figure 13a. Unloading Operation with Pilot Valve

SECTION IV - PRESSURE REDUCING COVERS

The function of the pressure reducing cover assembly is to provide a constant outlet pressure that is below inlet pressure. Two types of pressure reducing covers are available. The pressure reducing covers and their respective functions and sizes are listed below.

Cover Type	Functional Symbol	Size (mm)
X Pressure Reducing		16, 25
X1 Pressure Reducing/ NFPA-D03 Pilot Interface		16, 25

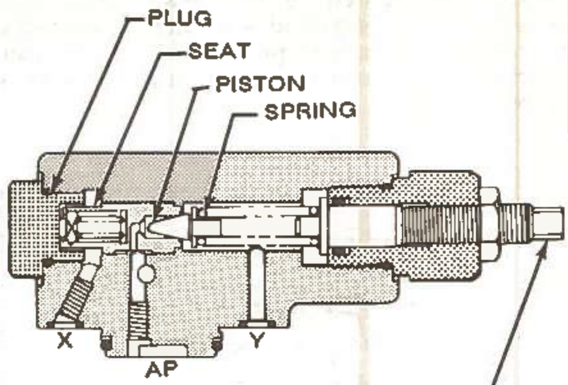


Figure 14. Pressure Reducing Cover (X Function)

A. Pressure Reducing (X Function)

Pressure reducing covers are assembled without orifices unless specified by a model code suffix.

Figure 14 shows the construction of a pressure reducing cover assembly. The cover consists of a seat, piston, spring, flow control, seals, and a pressure adjuster mechanism. This cover assembly is available in the 16 and 25mm size.

Figure 14a shows the operation of a pressure reducing valve. The 'B' port is connected to the pressure source. The 'B' port and 'X' port are interconnected within the manifold block. System pressure ('B' port) is fed to the 'X' port to the flow control. The flow control maintains a constant flow across the poppet independent of the flow from 'B' (p1) to 'A' (p2). When load pressure rises at the 'A' port, the insert spool moves to restrict flow to the load. If load pressure drops below the cracking pressure within the cover, the insert spring will move the insert poppet to increase flow through the valve to the 'A' port and increases the pressure in the 'A' port to the desired reducing pressure setting.

A check valve is located within the insert poppet to relieve pressure peaks at the load. Outlet pressure will drop to its minimum pressure setting when 'Z1' port is vented.

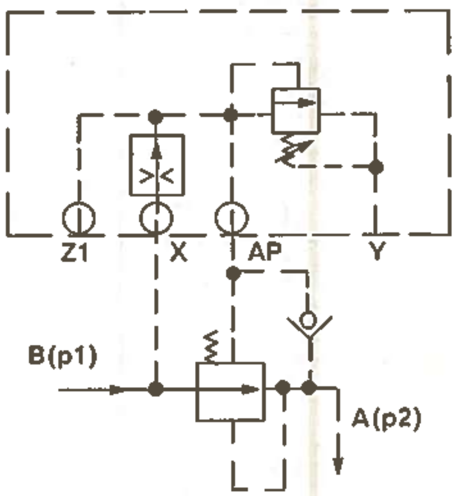


Figure 14a. Pressure Reducing Operation

B. Pressure Reducing with NFPA-D03 Pilot Interface (X1 Function)

This cover assembly (shown in Figure 15) is available in the 16 and 25mm size. This type of cover assembly has an NFPA-D03 interface for mounting a **DG4V-3-*AL-40** pilot valve, a **CGE-02** pilot valve, or a CVGC-3-10 pressure relief module. The pilot valve provides an integral control of the low or high reduced pressure setting. Pressure reducing operation with a pilot valve is shown in Figure 15a.

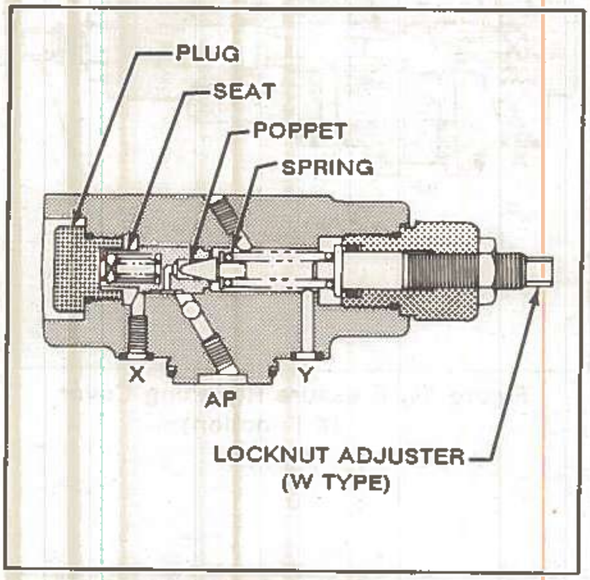


Figure 15. Pressure Reducing Cover with Pilot Interface (X1 Function)

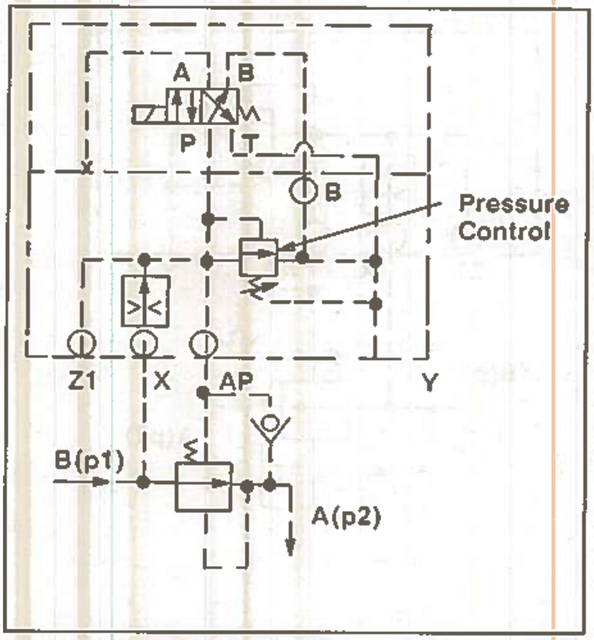


Figure 15a. Pressure Reducing Operation with Pilot Valve

When a CVGC pressure relief module is installed between the reducing cover and the pilot valve, the highest reduced pressure setting is controlled by the pilot valve and the lower reduced pressure setting is controlled by the CVGC module. The highest reduced pressure setting is active when the pilot valve is in the de-energized position. Provide at least 10 bar (150 psi) spread between the high and low pressure settings. Figure 15b shows the operation of a pressure reducing cartridge valve with dual pressure settings.

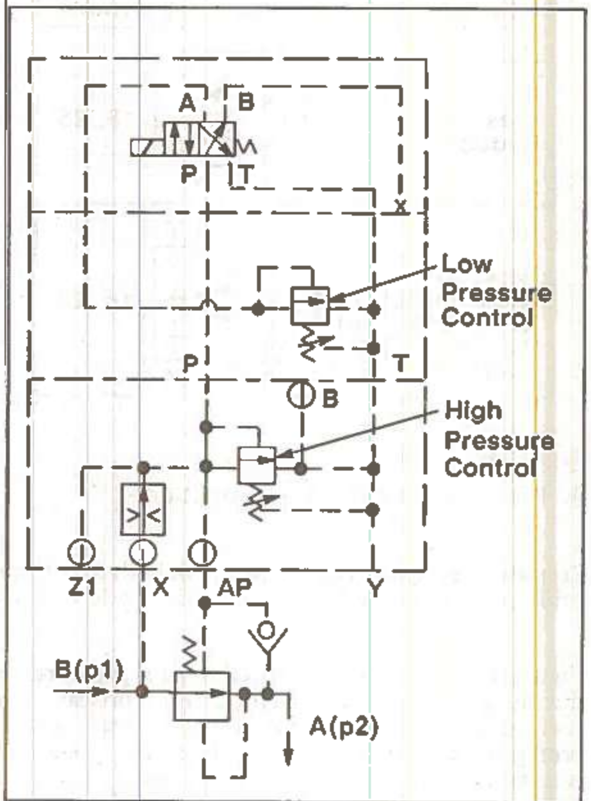


Figure 15b. Pressure Reducing Operation with Dual Pressure Settings

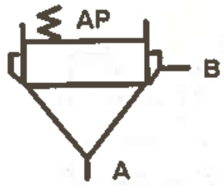
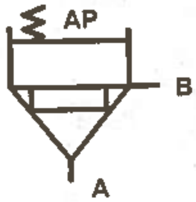
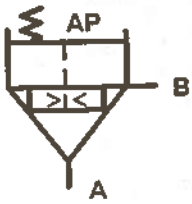
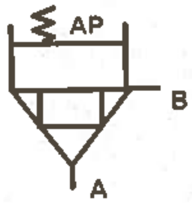
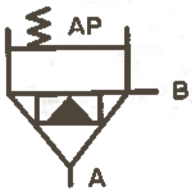
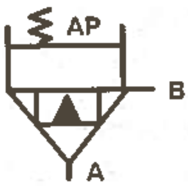
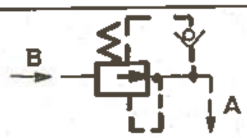
NOTE

If a CGE-02 pilot valve is used, the 'B' port must be plugged at the cover interface.

SECTION V - CARTRIDGE VALVE INSERTS

The cartridge insert functions as the working section of the the cartridge valve. Flow passes through the valve when pressure from an external source exceeds the predetermined cracking pressure of the insert. The cracking pressure is determined by the poppet spring force.

The insert provides directional flow for normal applications and controlled flow or restrictive flow for sensitive applications. Seven basic types of inserts are available. The types of inserts and their respective functions and sizes are listed below.

Insert Type	Function	Functional Symbol	Size (mm)
Directional	D10		16, 25, 32, 40
Directional	D11		16, 25, 32, 40, 50, 63
Directional with Orifice	D11		16, 25, 32, 40
Directional	D20		16, 25, 32, 40, 50, 63
Restrictor	R		16, 25, 32, 40, 50, 63
Flow Control	F		16, 25, 32, 40, 50, 63
Reducing	X1		16, 25

A. Flow Ratings

The cartridge insert, unlike a spool type valve, does not have a malfunction flow (with the exception of the X1 pressure reducer insert). The poppet will open or close regardless of flow. As flow increases through the valve, a pressure drop will occur across the valve. Cartridge valves are rated by the amount of flow that passes through the valve with a 14.5 psi (1 bar) or 72.5 psi (5 bar) pressure drop. Table 5 provides flow ratings for 1:1.1 area ratios. Refer to the installation drawings (Table 8) for flow ratings on other area ratios.

Valve or Port Size	Port Size	Flow @ 14.5 psi (1 bar)		Flow @ 72.5 psi (5 bar)	
(mm)	(inch)	l/m	(gpm)	l/m	(gpm)
16	0.63	80	(21)	200	(53)
25	0.98	190	(50)	450	(119)
32	1.25				
40	1.57	550	(145)	1100	(291)
50	1.97	900	(238)	1700	(449)
63	2.48	1100	(290)	2800	(740)

Table 5. Cartridge Valve Flow Ratings for 1:1.1 AreA Ratios

B. Insert Kit Description

Figure 16 illustrates the standard cartridge insert kit with a 1:1 area ratio. The insert kit consists of a spring, poppet, sleeve, and associated seals. As illustrated in Figure 16a, the cartridge valve insert kit has three major areas; the 'A' port, the 'B' port and the 'AP' pilot port. The 'A' port area is circular and is defined by the poppet to sleeve sealing diameter. The 'B' port area is defined as the difference between the 'AP' area and the 'A' area. The 'AP' area is the circular area defined as the diameter at the top portion of the poppet. Pressure at the 'AP' area plus the spring force holds the poppet down. Pressure at the 'A' or 'B' area lifts the poppet off its seat and allows flow through the valve.

NOTE

Unlike all other cartridge inserts, the reducer insert contains a spool rather than a poppet. Therefore, no reference is made to an area ratio. The spool also incorporates an internal check valve which relieves pressure peaks at the load pressure.

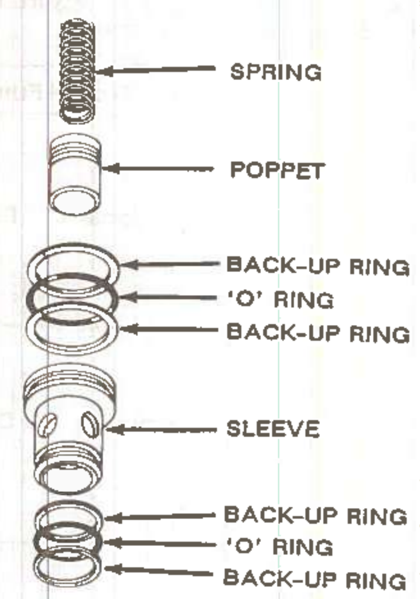


Figure 16. Cartridge Insert Kit

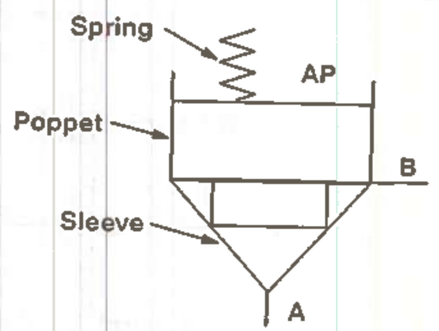


Figure 16a. Cartridge Insert Kit Operation

C. Insert Kit Identification

Four steps must be taken to determine the type of cartridge insert kit. These steps are:

1. Determine the metric size of the insert kit by measuring across the larger diameter of the sleeve. Refer to Table 6 below to establish the size. Note that the insert kit size is the same as the cover size.

Sleeve Size mm	Sleeve Size inch
16	1.260
25	1.771
32	2.362
40	2.952
50	3.543
63	4.724

Table 6. Sleeve Diameter

2. Determine the area ratio of the poppet. The poppet area ratio is determined by comparing (AP) area at the top of the poppet with the (A) area at the bottom of the poppet. For example, if the area at the top of the poppet is twice the area of the bottom portion of the poppet, the area ratio is 1:2. Three types of area ratios are available; 1:1, 1:1.1 and 1:2. Poppet area ratios are shown in figure 17.

NOTE

On pressure relief applications, a special 1:1.04 insert ratio must be used when the pressure setting exceeds 3600 psi (250 bar). Refer to Table 11 for insert kits.

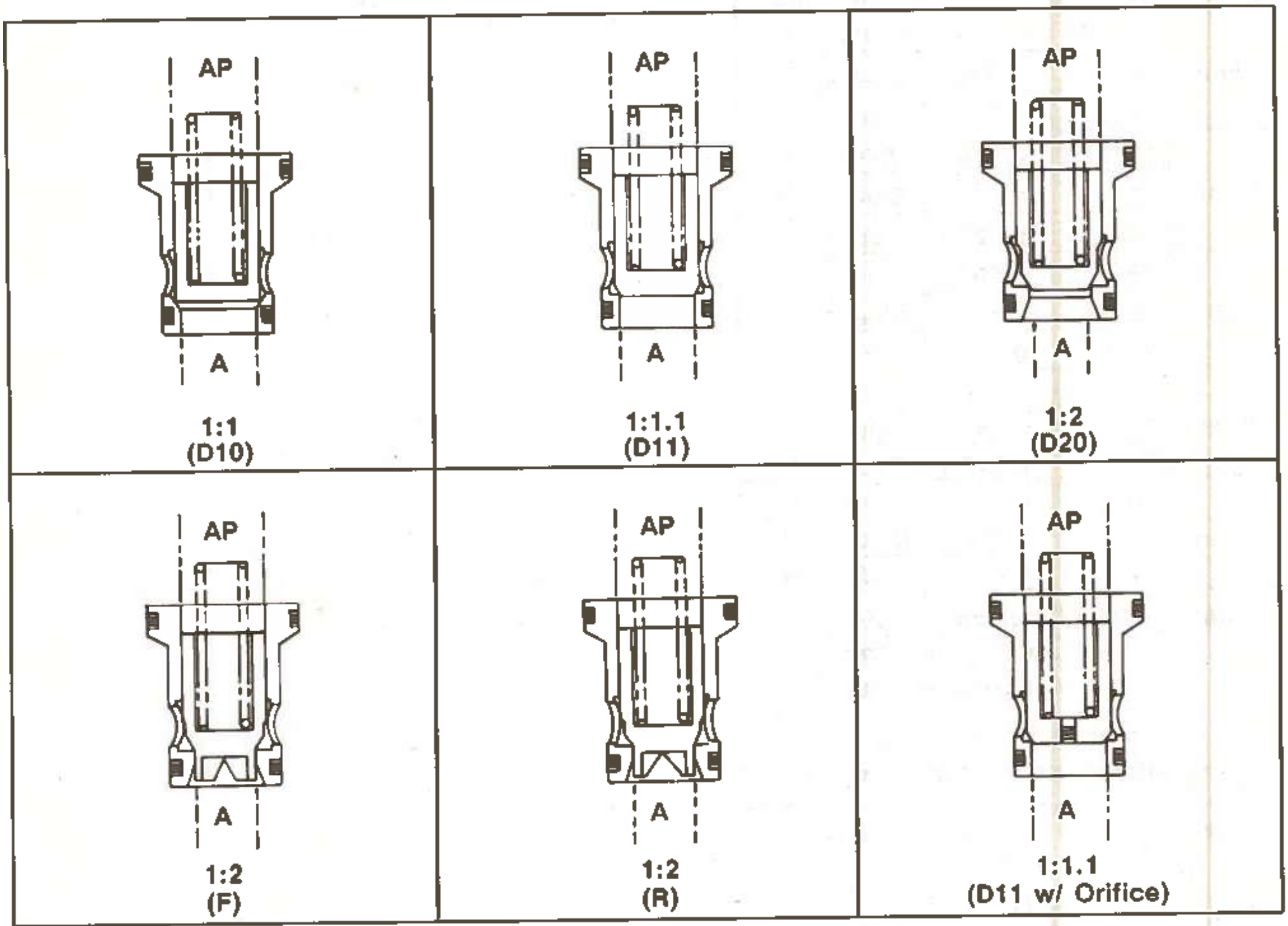


Figure 17. Poppet Area Ratios

3. Measure the insert spring wire diameter with a micrometer. This measurement will determine the cracking pressure of the spring.

NOTE

The spring may be color dyed for easier identification purposes. The spring color is cross referenced to a letter code that identifies spring cracking pressure. If the spring does not have a color, determine the spring cracking pressure by the wire diameter. Refer to Table 7 for the spring wire diameter and color code.

Valve Size	Insert Spring	Wire Diameter Inch	Color Code	Letter Code
16mm	761564	0.039	White	L
	761565	0.055	Blue	M
	761566	0.063	Red	H
25mm	761567	0.059	White	L
	761568	0.079	Blue	M
	761569	0.098	Red	H
32mm	815220	0.079	White	L
	815221	0.104	Blue	M
	815222	0.128	Red	H
40mm	761570	0.098	White	L
	761571	0.118	Blue	M
	761572	0.150	Red	H
50mm	763674	0.138	White	L
	763675	0.181	Blue	M
	763676	0.217	Red	H
63mm	763712	0.171	White	L
	763713	0.232	Blue	M
	763714	0.276	Red	H

Note: L = Low Cracking pressure
M = Medium Cracking Pressure
H = High Cracking Pressure

(Refer to Table 12 for additional spring information)

Table 7. Insert Spring Dimensions

4. Determine the type of insert kit and its related function from Table 11. The insert function may be determined by the number/letter code that is stamped on the insert sleeve. See Figure 2a.

Section VI – SYSTEM INSPECTION & MAINTENANCE

A. Installation Drawings

The installation drawings listed in Table 8 show installation dimensions and port locations for cartridge valves.

Cartridge Valve Type	Installation Drawing No.
Directional & Check	519200
Pressure Relief	519210
Pressure Reducing	519205

Table 8. Installation Drawings

B. Mounting

In general, cartridge valve mounting is unrestricted. It is recommended that the cartridge valve be mounted on a horizontal axis when a detented pilot valve is attached to the cartridge cover assembly. Cartridge valves are designed to be installed into a manifold block. This minimizes external circuit connections and provides a very compact package. Each cartridge valve installation is unique for a specific application. Many valve functions can be obtained within the manifold block.

C. Piping and Tubing

If a cartridge valve manifold block is actuator mounted, only pressure and tank lines are required. All pipes, tubing, and manifold passages must be thoroughly cleaned. Recommended methods of cleaning are sandblasting, wire brushing, pickling and power flushing. Refer to instruction sheet I–1221–S for pickling information.

Maintain only the amount of connections and fittings that are necessary for proper installation. This will minimize flow resistance and the possibility of leakage.

The number of bends in the tubing should be kept to a minimum to prevent excessive turbulence and friction of oil flow. Tubing must not be bent too sharply. The recommended minimum radius for tube bending is three times the inside diameter of the tube.

D. Hydraulic Fluid Recommendations

Hydraulic fluid performs the dual function of lubrication and transmission of power. Hydraulic fluid constitutes a vital factor in a hydraulic system. Careful selection of the fluid should be made with the assistance of a reputable supplier. Proper fluid selection provides satisfactory life and operation of system components. Fluid selected for valves must also be acceptable for the system pumping source and actuator. Refer to data sheet I–286–S for selection of hydraulic fluids.

E. Adding Fluid to the System

When hydraulic fluid is added to replenish the system, it should always be poured through a fine wire screen (200 mesh or finer) or preferably pumped through a 10 micron absolute filter. It is important that the fluid be kept clean and free from any substance that could cause improper operation or wear of the hydraulic unit. Therefore, the use of cloth to strain the fluid should be avoided.

F. System Cleanliness

Thorough precautions should be observed to insure the hydraulic system is clean at all times. Perform the following steps:

1. Clean (flush) any new system to remove paint, metal chips, welding shot, etc.

2. Filter each change of fluid to prevent the introduction of contaminants.

3. Provide continuous fluid filtration to remove sludge, products of wear, and corrosion that has generated during the life of the system. Maintain an ISO cleanliness code of 18/13 or cleaner. System cleanliness may be obtained through the use of Vickers OFP, OFR or OFRS series filters.

4. Seal the system to prevent the introduction of airborne contaminants.

G. Sound Level

Noise is only indirectly affected by fluid selection. However, the condition of the fluid is very important for obtaining optimum reductions of system sound levels. Some of the major factors that cause noise in a hydraulic system are:

1. Very high fluid viscosity at start–up temperatures

2. Running the system with moderately high fluid viscosity

3. Improper circuit or reservoir design

H. Adjustments

The only cartridge valves that have an adjustment are the units with the stroke adjustment feature. Stroke adjusters limit the insert poppet travel and act as a flow regulator in the circuit. In general, adjusting the orifice sizes in the valve cover will not be required since the system is tuned during the design phase.

I. Product Life

The service life of this product is dependent upon environment, duty cycle, operating parameters, and system cleanliness. Since these parameters vary from application to application, the ultimate user must determine and establish the periodic maintenance requirements to maximize life and detect potential component failure.

J. Replacement Parts

Reliable operation throughout the specified operating range is assured only if genuine Vickers parts are used. Sophisticated design processes and material are used in the manufacture of our parts. Substitutions may result in early failure.

SECTION VII - OVERHAUL & PARTS INFORMATION

WARNING

Before breaking a circuit connection, make sure that power is off and system pressure is released. Lower all vertical cylinders, discharge accumulators, and block any load that could generate pressure.

CAUTION

Absolute cleanliness is essential when working on a hydraulic system. Always work in a clean area. The presence of dirt and foreign materials in the system can result in serious damage or inadequate operation.

NOTE

Discard and replace all o-rings, gaskets, and back-up rings removed during disassembly.

A. Service Tools

The following service tools are required to overhaul a cartridge valve.

1. A torque wrench with hex bit adapters. Refer to Table 9 for appropriate torque wrench values.

Cover Size	Mounting Screw	
	N.m	lb.ft.
16mm	35	26
25mm	110	80
32mm	285	210
40mm	500	370
50mm	580	430
63mm	1200	890

Table 9. Torque Requirements

2. A set of U.S.A. and metric hex key wrenches
3. A set of small pin punches
4. A 3/8 inch ratchet with sockets
5. A small ball peen hammer
6. A 1 inch micrometer
7. A suitable piece of hardwood or nylon block to install sleeve
8. A suitable extractor tool to remove insert poppet and sleeve

B. Cartridge Cover Disassembly & Assembly

Perform the following steps:

1. Locate the appropriate cover assembly figure number from the following listing (page 22 & 23). Refer to exploded view drawings 18 through 27 when ordering replacement parts.
2. If required, remove the pilot valve from top of cover assembly.
3. Remove the cover from the manifold block
4. Disassemble the cover according to item number sequence order.
5. Inspect the cover parts for damage or excessive wear. Make sure all orifices are open and free from dirt. If a new orifice plug is required, refer to Table 10 and obtain an orifice kit. Orifices have been redesigned from a screwdriver slot to hex head.

Color/ Size	Valve Size (mm)		
	16	25/32/40	50/63
Red 0.5	635132	635149	
White 0.6	635133	635150	
Green 0.7	* 635134	* 635151	
Blue 0.8	635135	635152	* 635173
Purple 0.9		* 635153	
Yellow 1.0	* 635136	* 635154	* 635174
Pink 1.1	635137	635155	
Orange 1.2	* 635138	* 635156	* 635175
Violet 1.3	635139	* 635157	
Brown 1.4	635140	* 635158	
Grey 1.5	* 635141	* 635159	* 635176
1.6		691050	* 635177
1.7		635160	
1.8		675990	* 635178
2.0		675991	635179
2.3	635142		
2.5		635161	
2.7		730463	
3.0		730464	635180
3.2		691279	
5.4			675958
Solid Plug	* 35633	* 812	* 675169
* Orifice Kit	926281	926282	926283

* Included in Orifice Kit

NOTE: Orifices availabe only in kits. Kits contain 3 of each size. Threads are inch and orifice diameter is millimeter.

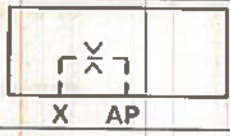
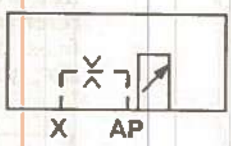
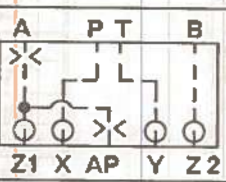
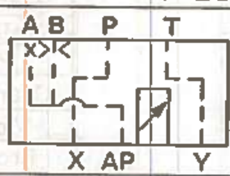
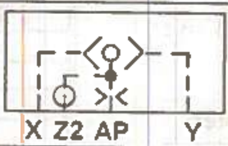
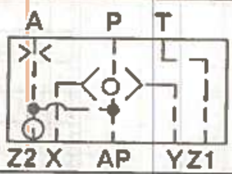
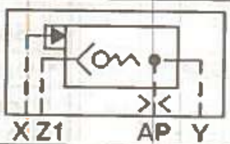
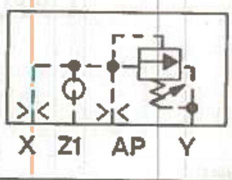
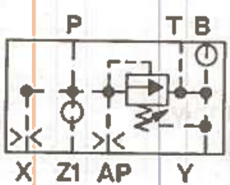
Table 10. Orifice Kits

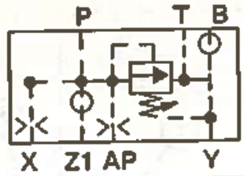
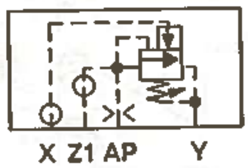
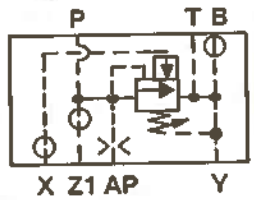
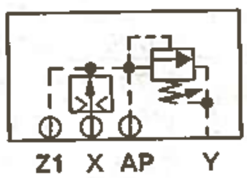
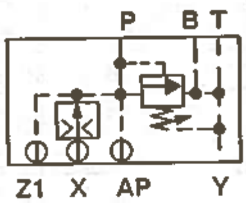
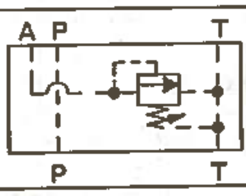
NOTE

If a complete cover assembly is required, obtain a new cover assembly by the model code that is stamped on the cover nameplate.

NOTE

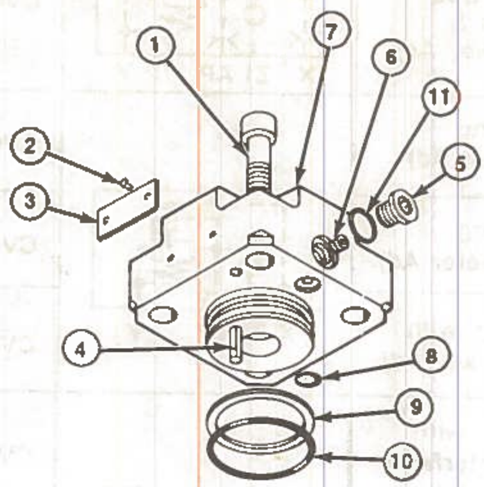
Cover assemblies that have an NFPA-D03 interface were formally designated as NFPA-D01. Cover assemblies that have an NFPA-D05 interface were formally designated as NFPA-D02 .

Parts Figure No.	Cover Type	Functional Symbol	Cover Assembly Model Code
18	Directional		CVC-**-N-S2-10
19	Directional with Locknut Adj.		CVC-**-A-S2-W-10
	Directional with Micrometer Adj.		CVC-**-A-S2-M-10
	Directional with Micrometer/key Adj.		CVC-**-A-S2-K-10
20	Directional with NFPA-D03 Interface (D1 Function Shown)		CVC-**-D1-S2-10
	Directional with NFPA-D05 Interface		CVC-**-D2-S2-10
21	Directional with NFPA-D03 Interface & Locknut Adj. (NC-Normally Open Function Shown)		CVC-**-AD1-S2-W-10-NC
			CVC-**-AD1-S2-W-10-NO
22	Shuttle		CVC-**-W-S2-10
23	Shuttle with NFPA-D03 Interface (W11 Function Shown)		CVC-**-W11-S2-10
			CVC-**-W21-S2-10
23a	Shuttle with NFPA-D03 Interface (W31)		CVC-**-W31-S2-10
24	Pilot Operated Check		CVC-**-PC-S2-10
25	Pressure Relief with Locknut Adj.		CVC-**-C-S2-W-***-10
	Pressure Relief with Micrometer Adj.		CVC-**-C-S2-M-***-10
	Pressure Relief with Micrometer/Key		CVC-**-C-S2-K-***-10
25	Pressure Relief with NFPA-D03 Interface & Locknut Adj.		CVC-**-C1-S2-W-***-10
	Pressure Relief with NFPA-D03 Interface & Micrometer Adj.		CVC-**-C1-S2-M-***-10

25	Pressure Relief with NFPA-D03 Interface & Micrometer/key Adj.		CVC-**-C1-S2-K-***-10
26	Unloading with Locknut Adj.		CVC-**-U-S2-W-***-10
	Unloading with Micrometer Adj.		CVC-**-U-S2-M-***-10
	Unloading with Micrometer/key Adj.		CVC-**-U-S2-K-***-10
26	Unloading with NFPA-D03 Interface & Locknut Adj.		CVC-**-U1-S2-W-***-10
	Unloading with NFPA-D03 Interface & Micrometer Adj.		CVC-**-U1-S2-M-***-10
	Unloading with NFPA-D03 Interface & Micrometer/key Adj.		CVC-**-U1-S2-K-***-10
27	Pressure Reducing with Locknut Adj.		CVC-**-X-S2-W-***-10
	Pressure Reducing with Micrometer Adj.		CVC-**-X-S2-M-***-10
	Pressure Reducing with Micrometer/key Adj.		CVC-**-X-S2-K-***-10
27	Pressure Reducing with NFPA-D03 Interface & Locknut Adj.		CVC-**-X1-S2-W-***-10
	Pressure Reducing with NFPA-D03 Interface & Micrometer Adj.		CVC-**-X1-S2-M-***-10
	Pressure Reducing with NFPA-D03 Interface & Micrometer/key Adj.		CVC-**-X1-S2-K-***-10
28	Pressure Relief Module		CVCG-3-*-***-10

>< – Standard orifice location
○ – Tapped port for installation of an additional orifice

CVC-**-N-S2-10



NOTE
Bolt kit not included in cover assembly.

Figure 18. Directional Cover Assembly (N Function)

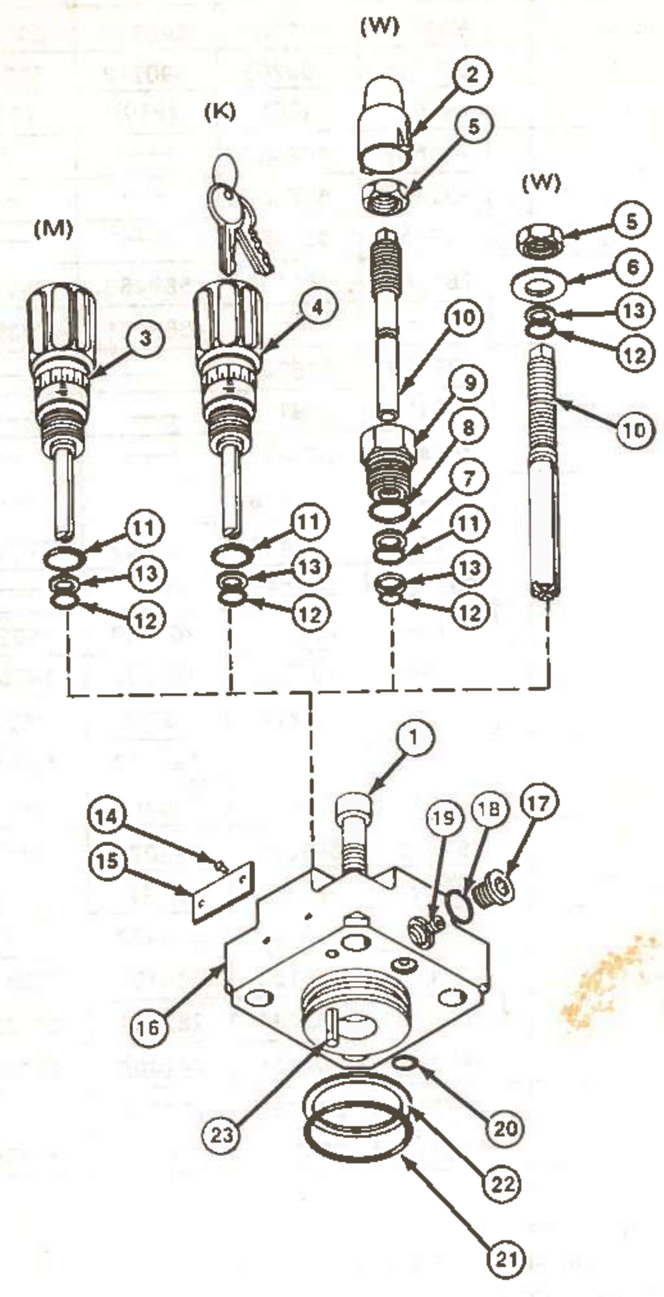
Item No.	Part Description	Size (mm)					
		16	25	32	40	50	63
1	Bolt Kit – inch	590700	590704	590713	590706	590708	590710
	– mm	590701	590705	590718	590707	590709	590711
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)	(430)	(890)
2	Screw (2 Req'd)	36212	36212	36212	36212	36212	36212
3	Nameplate	199082	199082	199082	199082	199082	199082
4	Roll Pin	168319	226797	226797	226797	195940	195940
5	Plug	398071	398071	398071	398071	315932	315932
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)	(22)	(22)
* 6	Orifice Plug (Std.)	635136	635156	635157	635158	635177	635178
■ 7	Cover	580013	580056	730408	580094	589106	589129
▲ 8	O-Ring	262330	262331	262332	262334	262334	262354
▲ 9	Back-up Ring	277652	277707	277712	277716	277781	277790
▲ 10	O-Ring	262360	262401	262406	262410	262467	262476
▲ 11	O-Ring	263492	263492	263492	263492	263496	263496

Note: 1 lb. ft. = .74 Nm.

▲ – Included in seal kit (Table 13)
■ – Not available for sale
* – Refer to Table 10 for other orifice sizes

Figure 18. Parts Tabulation

CVC-**-A-S2-*-10



NOTE
Bolt kit not included in cover assembly.

Figure 19. Directional Cover Assembly with Stroke Adjuster (A Function)

Item No.	Part Description	Valve Size (mm)					
		16	25	32	40	50	63
1	Bolt Kit – inch	590700	590704	590713	590706	590708	590710
	– mm	590701	590705	590718	590707	590709	590711
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)	(430)	(890)
◆ 2	Cap	762607	762607	—	—	—	—
3	Micrometer S/A (M)	637458	637460	—	—	—	—
4	Micrometer/key S/A (K)	637459	637461	—	—	—	—
◆ 5	Lock Nut	761190	761190	688469	761190	763770	763727
6	Washer	—	—	688471	763690	763726	688471
◆ 7	Adaptor	579922	579922	—	—	—	—
	Torque to (lb. ft.)	(81)	(81)	—	—	—	—
8	Circlip	762487	762487	—	—	—	—
9	Retaining Ring	762488	762488	—	—	—	—
◆ 10	Adjuster Rod	764458	764459	730407	579926	589151	589152
▲ 11	O-Ring	262355	262355	—	—	—	—
▲ 12	O-Ring	262350	262350	262349	262350	262390	262392
▲ 13	Back-up Ring	197588	197588	197587	197588	197628	197630
14	Screw (2 Req'd)	36212	36212	36212	36212	36212	36212
15	Nameplate	199082	199082	199082	199082	199082	199082
■ 16	Cover	580014	580057	730409	580095	589108	589131
17	Plug	398071	398071	398071	398071	315932	315932
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)	(22)	(22)
▲ 18	O-Ring	263492	263492	263492	263492	263496	263496
* 19	Orifice (Std.)	635136	635156	635157	635158	635177	635178
▲ 20	O-Ring	262330	262331	262332	262334	262334	262354
▲ 21	O-Ring	262360	262401	262406	262410	262467	262476
▲ 22	Back-up Ring	277652	277707	277712	277716	277781	277790
23	Roll Pin	168319	226797	226797	226797	195940	195940

Note: 1 lb. ft. = .74 Nm.

▲ – Included in seal kit (Table 13)

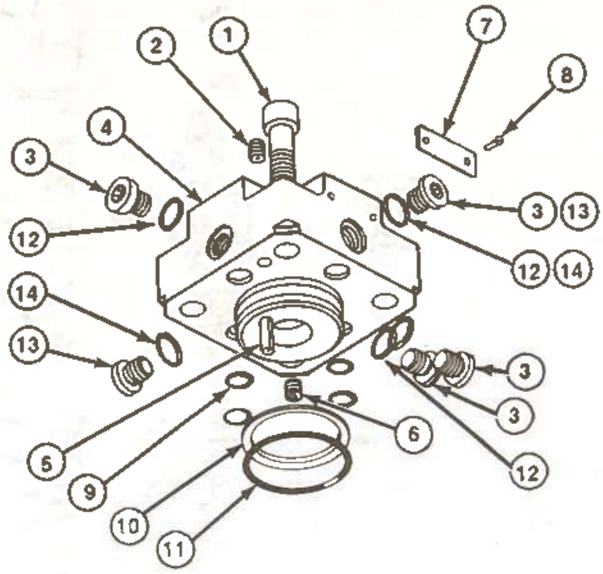
◆ – Included in adjuster rod kit 941472 (16, 25mm only)

* – Refer to Table 10 for other orifice sizes

■ – Not available for sale

Figure 19. Parts Tabulation

CVC-**-D1-S2-10
CVC-**-D2-S2-10



NOTE
Bolt kit not included in cover assembly.

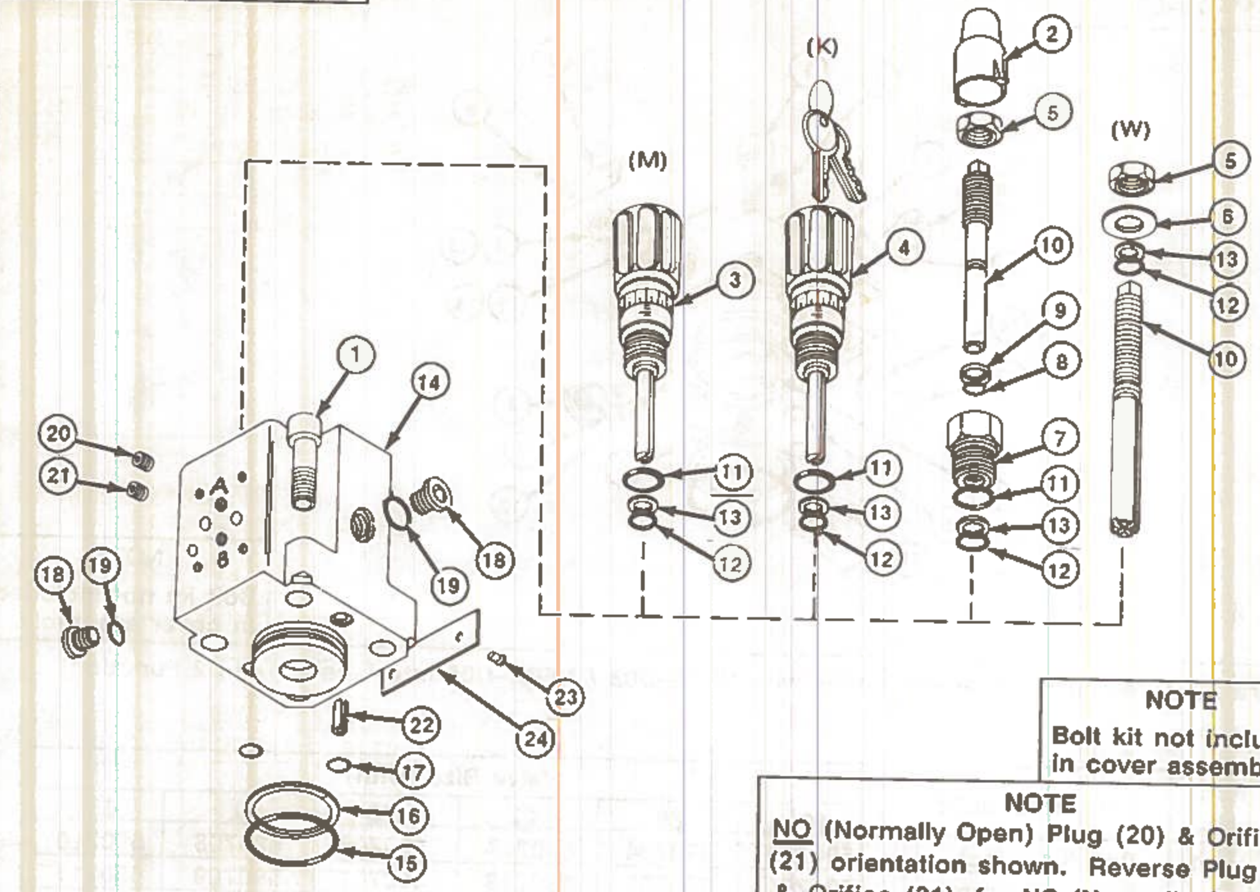
Figure 20. Directional Cover Assembly with NFPA-D03 / NFPA-D05 Interface (D1 & D2 Function)

Item No.	Part Description	Valve Size (mm)					
		16	25	32	40	50	63
1	Bolt Kit – inch	590700	590704	590713	590706	590708	590710
	– mm	590701	590705	590718	590707	590709	590711
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)	(430)	(890)
* 2	Orifice (Std.)	635136	635156	635157	635158	—	—
3	Plug (Qty.)	398071 (4)	398071 (4)	398071 (4)	398071 (4)	315932 (3)	315932 (3)
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)	(22)	(22)
■ 4	Cover (NFPA-D03)	730705	580058	730410	580096	—	—
	Cover (NFPA-D05)	—	—	—	—	589107	589130
5	Roll Pin	168319	226797	226797	226797	195940	195940
* 6	Orifice (Std.)	—	—	—	—	635177	635178
7	Nameplate	199082	199082	199082	199082	199082	199082
8	Screw (2 Req'd)	36212	36212	36212	36212	36212	36212
▲ 9	O-Ring (4 Req'd)	262330	262331	262332	262334	262334	262354
▲ 10	Back-up Ring	277652	277707	277712	277716	277781	277790
▲ 11	O-Ring	262360	262401	262406	262410	262467	262476
▲ 12	O-Ring	263492	263492	263492	263492	263496	263496
13	Plug (2 Req'd)	—	—	—	—	343740	343740
	Torque to (lb. ft.)	—	—	—	—	(11)	(11)
▲ 14	O-Ring	—	—	—	—	263494	263494

Note: 1 lb. ft. = .74 Nm.
▲ – Included in seal kit (Table 13)
■ – Not available for sale
* – Refer to Table 10 for other orifice sizes

Figure 20. Parts Tabulation

CVC-**-AD1-S2-*-10-NC
CVC-**-AD1-S2-*-10-NO



NOTE
Bolt kit not included in cover assembly.

NOTE
NO (Normally Open) Plug (20) & Orifice (21) orientation shown. Reverse Plug (20) & Orifice (21) for NC (Normally Closed) operation.

Figure 21. Directional Cover Assembly with NFPA-D03 Interface and Stroke Adjuster (AD1 Function)

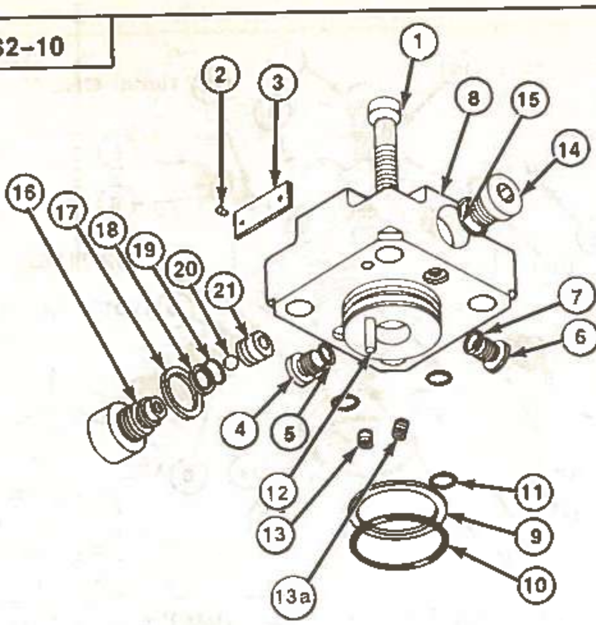
Item No.	Part Description	Valve Size (mm) 25	40
1	Bolt Kit – inch	590704	590706
	– mm	590705	590707
	Torque to (lb. ft.)	(81)	(370)
2	Cap	762607	———
3	Micrometer S/A (M)	730236	———
4	Micrometer/key S/A (K)	730235	———
5	Lock Nut	761190	761190
6	Washer	———	761192
7	Adaptor	579922	———
8	Circlip	762487	———
9	Retaining Ring	762488	———
10	Adjuster Rod	730128	730120
▲ 11	O-Ring	262355	———
▲ 12	O-Ring	262350	262350
▲ 13	Back-up Ring	197588	197588

Note: .74 Nm. = 1 ft. lb.
▲ – Included in seal kit (Table 13)

Item No.	Part Description	Valve Size (mm) 25	40
■ 14	Cover	684793	684798
▲ 15	O-Ring	262401	262410
▲ 16	Back-up Ring	277707	277716
▲ 17	O-Ring (2 Req'd)	262331	262334
18	Plug (2 Req'd)	———	398071
	Torque to (lb. ft.)	———	(7.4)
▲ 19	O-Ring (2 Req'd)	———	263492
20	Plug (NO) @ A Port	812	812
* 21	Orifice (NO) @ B Port	635156	635158
20	Plug (NC) @ B Port	812	812
* 21	Orifice (NC) @ A Port	635156	635158
22	Roll Pin	226797	226797
23	Screw (2 Req'd)	36212	36212
24	Nameplate	199082	199082

■ – Not available for sale
* – Refer to Table 10 for other orifice sizes

Figure 21. Parts Tabulation



Item No.	Part Description	Part No.
16	Plug	760881
	Torque (lb. ft.)	(75)
▲ 17	USIT Ring	763633
▲ 18	Back-up Ring	580550
▲ 19	O-ring	262333
20	Ball	1651
21	Seat	760882

NOTE
Bolt kit not included in cover assembly.

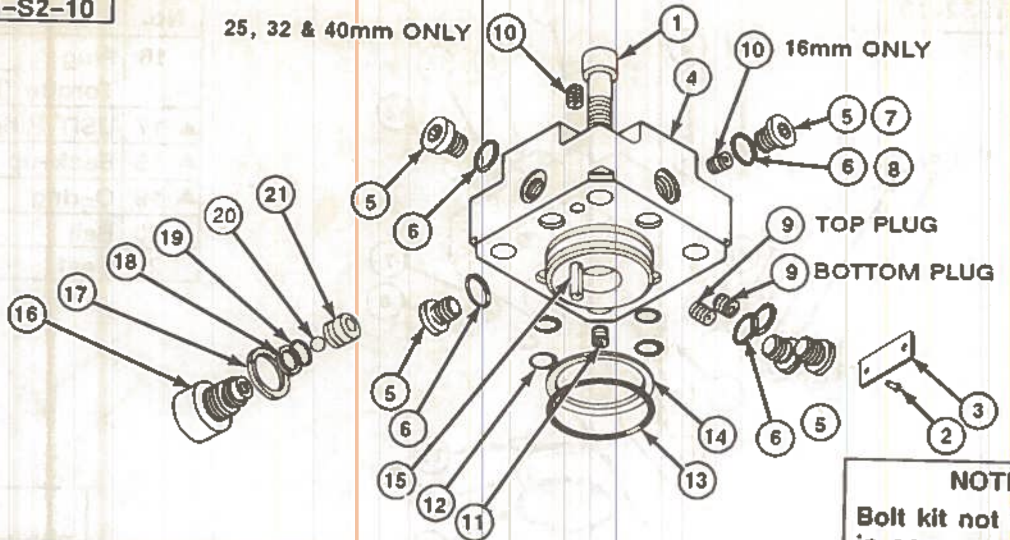
Figure 22. Shuttle Cover Assembly (W Function)

Item No.	Part Description	Valve Size (mm)			
		16	25	32	40
1	Bolt Kit – inch	590700	590704	590713	590706
	– mm	590701	590705	590718	590707
	Torque to (lb. ft.)	(26)	(81)	(210)	(370)
2	Screw (2 Req'd)	36212	36212	36212	36212
3	Nameplate	199082	199082	199082	199082
4	Plug	—	—	398071	398071
	Torque to (lb. ft.)	—	—	(7.4)	(7.4)
▲ 5	O-Ring	—	—	263492	263492
6	Plug	398071	398071	398071	398071
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
▲ 7	O-Ring	263492	263492	263492	263492
■ 8	Cover	580016	580060	730412	580098
▲ 9	Back-up Ring	277652	277707	277712	277716
▲ 10	O-Ring	262360	262401	262406	262410
▲ 11	O-Ring (3 req'd)	262330	262331	262332	262334
12	Roll Pin	168319	226797	226797	226797
* 13	Orifice (Std.)	635136	635156	635157	635158
⊖ 13a	Solid Plug	—	—	812	812
14	Plug	315932	315932	315932	315932
	Torque to (lb. ft.)	(22)	(22)	(22)	(22)
▲ 15	O-Ring	263496	263496	263496	263496
16-21	See Figure 22	16, 25, 32, 40mm			

Note: 1 lb. ft. = .74 Nm.
▲ – Included in seal kit (Table 13)
■ – Not available for sale
* – Refer to Table 10 for other orifice sizes
⊖ – Do Not Remove

Figure 22. Parts Tabulation

CVC-**-W11-S2-10
CVC-**-W21-S2-10



NOTE
Bolt kit not included in cover assembly.

Figure 23. Shuttle Cover Assembly with NFPA-D03 Interface (W11 & W21 Function)

	Item No.	Part Description	Valve Size (mm) 16	25	32	40
	1	Bolt Kit - Inch	590700	590704	590713	590706
		- mm	590701	590705	590718	590707
		Torque to (lb. ft.)	(26)	(81)	(210)	(370)
	2	Screw (2 Req'd)	36212	36212	36212	36212
	3	Nameplate	199082	199082	199082	199082
	4	Cover	730850	580062	730413	580100
■	5	Plug (Qty.)	398071(4)	398071(5)	398071(4)	398071(4)
		Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
▲	6	O-Ring (Qty.)	263492(4)	263492(5)	263492(4)	263492(4)
	7	Plug	—	—	315932	315932
		Torque to (lb. ft.)	—	—	(22)	(22)
	8	O-Ring	—	—	263496	263496
	9	Plug	See Table Below			
*	10	Orifice (Std.)	635136	635156	635157	635158
⊖	11	Plug	Omit	812	812	812
▲	12	O-Ring (4 Req'd)	262330	262331	262332	262334
▲	13	O-Ring	262360	262401	262406	262410
▲	14	Back-up Ring	277652	277707	277712	277716
	15	Roll Pin	168319	226797	226797	226797
	16	Plug	760881	760881	760881	760881
		Torque to (lb. ft.)	(75)	(75)	(75)	(75)
▲	17	USIT Ring	763633	763633	763633	763633
▲	18	Back-up Ring	580550	580550	580550	580550
▲	19	O-Ring	262333	262333	262333	262333
	20	Ball	1651	1651	1651	1651
	21	Seat	760882	760882	760882	760882

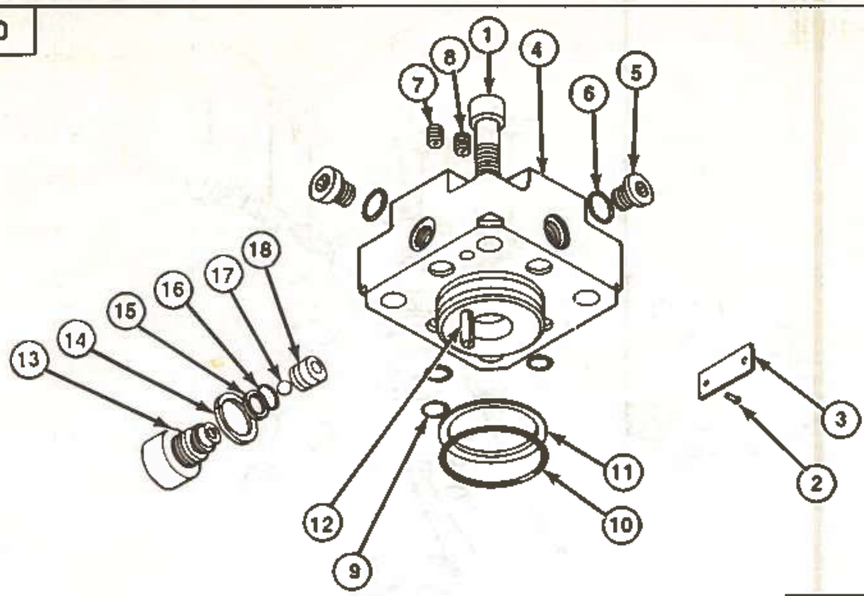
Note: 1 lb. ft. = .74 Nm.
▲ - Included in seal kit (Table 13)
■ - Not available for sale
* - Refer to Table 10 for other orifice sizes.
⊖ - Do Not Remove

Cover	mm	Bottom Plug	Top Plug
Type W11	16	Out	35633
Type W21	16	35633	Out
Type W11	25 32 40	812	Out
Type W21	25 32 40	Out	812

Item No. 9 Plug

Figure 23. Parts Tabulation

CVC-**-W31-S2-10



NOTE
Bolt kit not included in cover assembly.

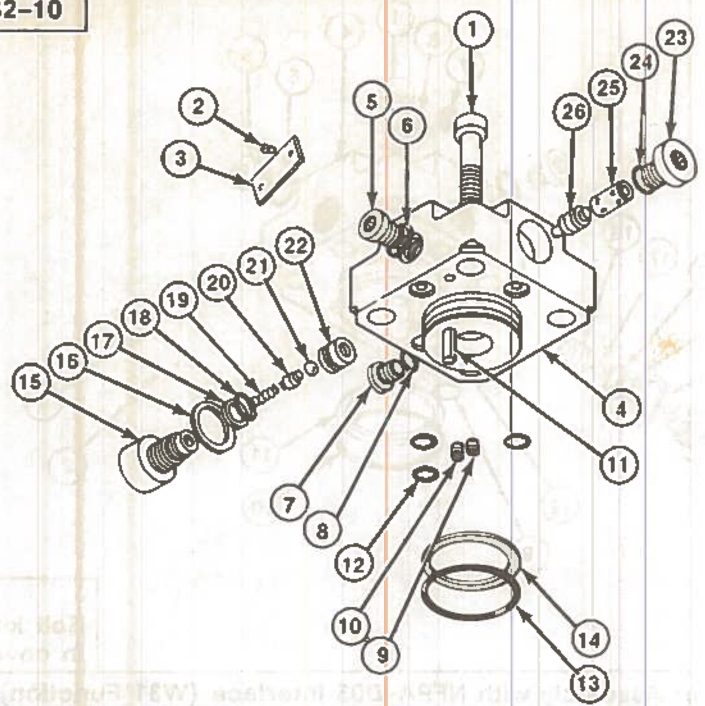
Figure 23a. Shuttle Cover Assembly with NFPA-D03 Interface (W31 Function)

Item No.	Part Description	Valve Size (mm)			
		16	25	32	40
1	Bolt Kit - inch	590700	590704	590713	590706
	- mm	590701	590705	590718	590707
	Torque to (lb. ft.)	(26)	(81)	(210)	(370)
2	Screw (2 Req'd)	36212	36212	36212	36212
3	Nameplate	199082	199082	199082	199082
■ 4	Cover	517261	477104	476657	477368
5	Plug (Qty.)	398071(1)	398071(2)	398071(2)	398071(2)
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
▲ 6	O-Ring (Qty.)	263492(1)	263492(2)	263492(2)	263492(2)
7	Plug (@ 'B')	35633	812	812	812
* 8	Orifice (Std.) (@ 'A')	635136	635156	635157	635158
▲ 9	O-Ring (3 Req'd)	262330	262331	262332	262334
▲ 10	O-Ring	262360	262401	262406	262410
▲ 11	Back-up Ring	277652	277707	277712	277716
12	Roll Pin	168319	226797	226797	226797
13	Plug	760881	760881	760881	760881
	Torque to (lb. ft.)	(75)	(75)	(75)	(75)
▲ 14	USIT Ring	763633	763633	763633	763633
▲ 15	Back-up Ring	580550	580550	580550	580550
▲ 16	O-Ring	262333	262333	262333	262333
17	Ball	1651	1651	1651	1651
18	Seat	760882	760882	760882	760882

Note: 1 lb. ft. = .74 Nm.
▲ - Included in seal kit (Table 13)
■ - Not available for sale
* - Refer to Table 10 for other orifice sizes.

Figure 23a. Parts Tabulation

CVC-**-PC-S2-10



NOTE
Bolt kit not included in cover assembly.

Figure 24. Pilot Operated Check Cover Assembly (PC Function)

	Item No.	Part Description	Valve Size (mm) 16	25	32	40
	1	Bolt Kit – inch	590700	590704	590713	590706
		– mm	590701	590705	590718	590707
		Torque to (lb. ft.)	(26)	(80)	(210)	(370)
	2	Screw (2 Req'd)	36212	36212	36212	36212
	3	Nameplate	199082	199082	199082	199082
■	4	Cover	580017	580061	730411	580099
	5	Plug	398071	398071	398071	398071
		Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
▲	6	O-Ring	263492	263492	263492	263492
	7	Plug	—	—	398071	398071
		Torque to (lb. ft.)	—	—	(7.4)	(7.4)
▲	8	O-Ring	—	—	263492	263492
*	9	Orifice (Std.)	635136	635156	635157	635158
⊖	10	Plug	—	—	812	812
	11	Roll Pin	168319	226797	226797	226797
▲	12	O-Ring (3 Req'd)	262330	262331	262332	262334
▲	13	O-Ring	262360	262401	262406	262410
▲	14	Back-up Ring	277652	277707	277712	277716

	Item No.	Part Description	Size(mm) 16-40
	15	Plug	760881
		Torque (lb. ft.)	(75)
▲	16	USIT Ring	763633
▲	17	Back-up Ring	580550
▲	18	O-Ring	262333
	19	Spring	544103
	20	Spool	760889
	21	Ball	1651
	22	Seat	760882
	23	Plug	315932
		Torque (lb. ft.)	(22)
▲	24	O-Ring	263496
	25	Spacer (16mm)	Omit
		Spacer (25mm)	760843
		Spacer (32mm)	730435
		Spacer (40mm)	761506
	26	Pilot Spool	760928

Note: 1 lb. ft. = .74 Nm.
▲ – Included in seal kit (Table 13)
■ – Not available for sale
* – Refer to Table 10 for other orifice sizes
⊖ – Do not remove.

Figure 24. Parts Tabulation

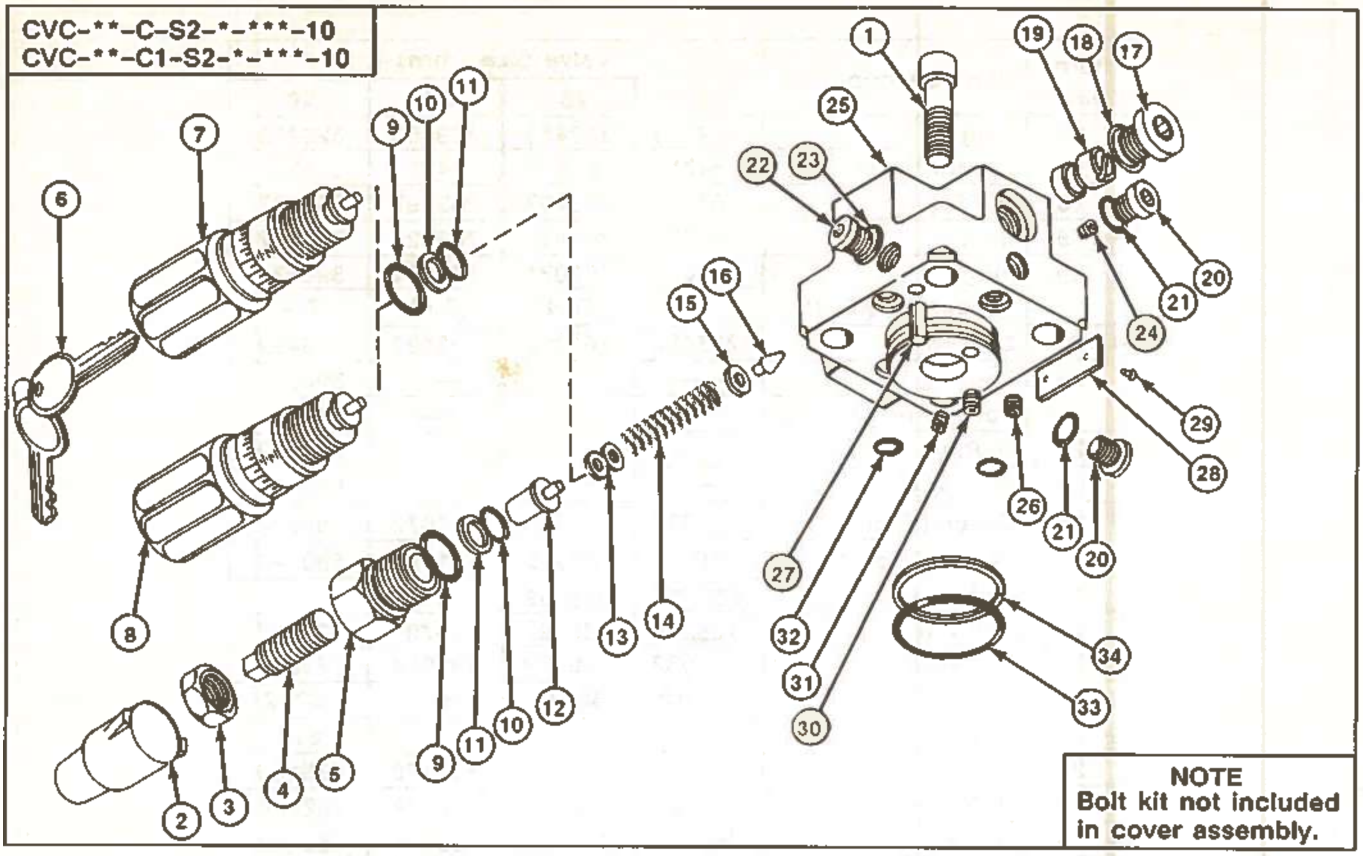


Figure 25. Pressure Relief Cover Assembly (C & C1 Function)

Item No.	Part Description	Valve Size (mm)			
		16	25	32	40
1	Bolt Kit – inch	590702	590704	590713	590706
	– mm	590703	590705	590718	590707
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)
◆ 2	Cap	762607	762607	762607	762607
◆ 3	Lock Nut	761190	761190	761190	761190
◆ 4	Adjusting Rod	762918	762918	762918	762918
◆ 5	Adaptor	579922	579922	579922	579922
	Torque to (lb. ft.)	(75)	(75)	(75)	(75)
6	Keys (1 set of 2)	814573	814573	814573	814573
7	Micrometer/key S/A (K)	637463	637463	637463	637463
8	Micrometer S/A (M)	637462	637462	637462	637462
▲ 9	O-Ring	262335	262335	262335	262335
▲ 10	O-Ring	262350	262350	262350	262350
▲ 11	Back-up Ring	197588	197588	197588	197588
◆ 12	Guide	762919	762919	762919	762919
● 13	Shims	762920	762920	762920	762920
14	Spring (125 bar)	762928	762928	762928	762928
	Spring (245 bar)	762929	762929	762929	762929
	Spring (350 bar)	762930	762930	762930	762930
● 15	Washer	762921	762921	762921	762921
● 16	Poppet	290057	290057	290057	290057

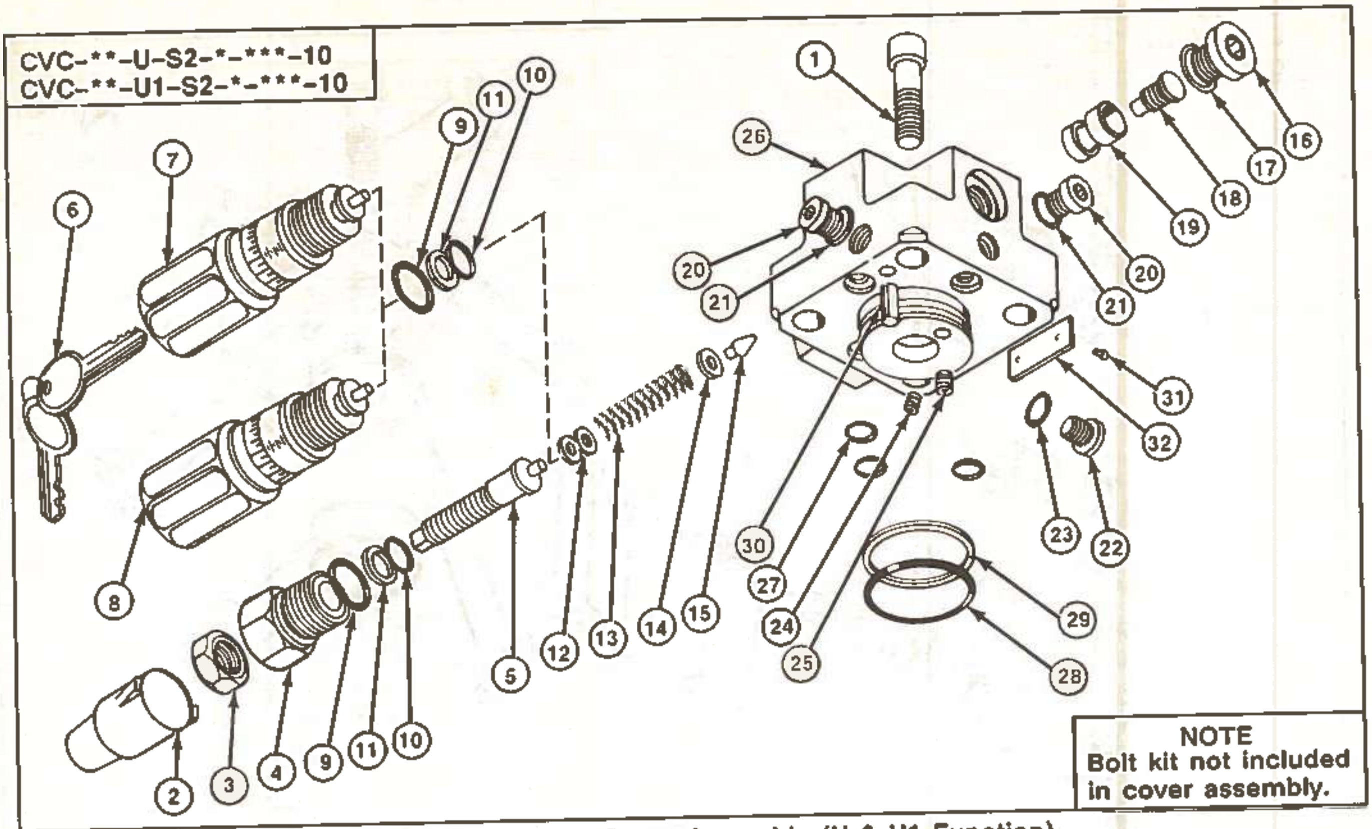
Figure 25. Parts Tabulation

Item No.	Part Description	Valve Size (mm)			
		16	25	32	40
17	Plug	329463	329463	329463	329463
	Torque to (lb. ft.)	(42)	(42)	(42)	(42)
▲ 18	O-Ring	263497	263497	263497	263497
● 19	Seat	762922	762922	762922	762922
20	Plug	398071	398071	398071	398071
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
▲ 21	O-Ring	263492	263492	263492	263492
22	Plug	—	—	—	398071
	Torque to (lb. ft.)	—	—	—	(7.4)
▲ 23	O-Ring	—	—	—	263492
* 24	Orifice (Std)	—	—	—	635154
■ 25	Cover (Type C)	579982	580266	731077	580327
	Cover (Type C1)	730455	580265	731078	580326
* 26	Orifice (Std)	635135	635152	635153	
27	Roll Pin	168319	226797	226797	226797
28	Nameplate	199082	199082	199082	199082
29	Screw (2 Req'd)	36212	36212	36212	36212
⊖ 30	Plug	—	—	—	812
* 31	Orifice (Std.)	635138	635156	635158	635159
▲ 32	O-Ring (3 Req'd)	262330	262331	262332	262334
▲ 33	O-Ring	262360	262401	262406	262410
▲ 34	Back-up Ring	277652	277707	277712	277716

Note: 1 lb. ft. = .74 Nm.
14.5 psi = 1 bar

▲ – Included in seal kit (Table 13)
■ – Not available for sale
* – Refer to Table 10 for other orifice sizes
◆ – Included in adjuster rod kit 941472
● – Included in poppet kit 941473
⊖ – Do Not Remove

Figure 25. Parts Tabulation (Continued)



NOTE
Bolt kit not included in cover assembly.

Figure 26. Unloading Cover Assembly (U & U1 Function)

Item No.	Part Description	Valve Size (mm) 16/25/32/40
2	Cap	762607
3	Lock Nut	764177
4	Adaptor	579692
	Torque to (lb. ft.)	(75)
5	Adjusting Rod	764176
6	Keys (1 set of 2)	814573
7	Micrometer/key S/A (K)	637463
8	Micrometer S/A (M)	637462
▲ 9	O-Ring	262355
▲ 10	O-Ring	262350
▲ 11	Back-up Ring	197588
● 12	Shims	762920
13	Spring (125 bar)	762928
	Spring (245 bar)	762929
	Spring (350 bar)	762930
● 14	Washer	762921
● 15	Poppet	290057
16	Plug	329463
	Torque to (lb. ft.)	(42)
▲ 17	O-Ring	263497
● 18	Plunger	815031
● 19	Seat	815030
20	Plug	398071
	Torque to (lb. ft.)	(7.4)
21	O-Ring	263492

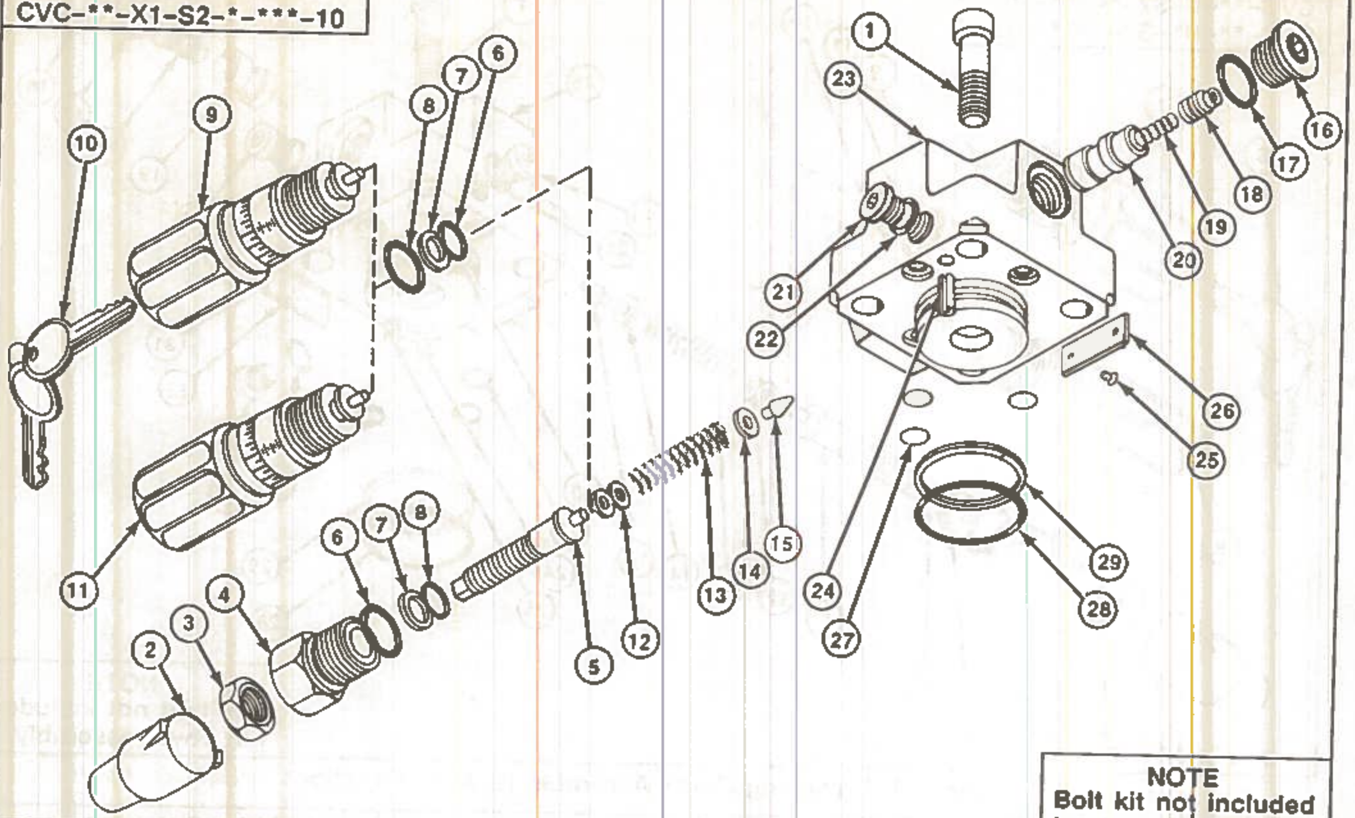
Item No.	Part Description	Valve Size (mm) 16	25	32	40
1	Bolt Kit - Inch	590702	590704	590713	590706
	- mm	590703	590705	590718	590707
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)
22	Plug	—	—	—	398071
	Torque to (lb. ft.)	—	—	—	(7.4)
23	O-Ring	—	—	—	263492
⊖ 24	Plug	—	—	—	812
* 25	Orifice (Standard)	635138	635156	635157	635158
■ 26	Cover (Type U)	579982	580266	731077	580327
	Cover (Type U1)	730455	580265	731078	580326
▲ 27	O-Ring (3 Req'd)	262330	262331	262332	262334
▲ 28	O-Ring	262360	262401	262406	262410
▲ 29	Back-up Ring	277652	277707	277712	277716
30	Roll Pin	168319	226797	226797	226797
31	Screw (2 Req'd)	36212	36212	36212	36212
32	Nameplate	199082	199082	199082	199082

Note: 1 lb. ft. = .74 Nm.
14.5 psi = 1 bar

▲ - Included in seal kit (Table 13)
● - Included in poppet kit
■ - Not available for sale
⊖ - Do Not Remove
* - Refer to Table 10 for other orifice sizes

Figure 26. Parts Tabulation

CVC-**-X-S2-*-***-10
CVC-**-X1-S2-*-***-10



NOTE
Bolt kit not included in cover assembly.

Figure 27. Pressure Reducing Cover Assembly (X & X1 Function)

	Item No.	Part Description	Valve Size(mm) 16	25
	1	Bolt Kit – inch	590702	590704
		– mm	590703	590705
		Torque to (lb. ft.)	(26)	(81)
◆	2	Cap	762607	762607
◆	3	Lock Nut	764177	764177
◆	4	Adaptor	579692	579692
◆	5	Adjuster Rod	764176	764176
▲	6	O-Ring	262350	262350
▲	7	Back-up Ring	197588	197588
▲	8	O-Ring	262355	262355
	9	Micrometer/key S/A (K)	637463	637463
	10	Keys (1 set of 2)	814573	814573
	11	Micrometer (M)	637642	637642
●	12	Shims	762920	762920
	13	Spring (125 bar)	762928	762928
		Spring (245 bar)	762929	762929
		Spring (350 bar)	762930	762930
●	14	Washer	762921	762921

	Item No.	Part Description	Valve Size(mm) 16	25
●	15	Poppet	290057	290057
	16	Plug	579921	579921
		Torque to (lb. ft.)	(42)	(42)
▲	17	O-Ring	263497	263497
●	18	Spool	764172	764172
●	19	Spring	544103	544103
●	20	Seat	764171	764171
	21	Plug	398071	398071
		Torque to (lb. ft.)	(7.4)	(7.4)
▲	22	O-Ring	263492	263492
■	23	Cover (Type X)	579982	580266
		Cover (Type X1)	730455	580265
	24	Roll Pin	168319	226797
	25	Screw (2 Req'd)	36212	36212
	26	Nameplate	199082	199082
▲	27	O-Ring (3 Req'd)	262330	262331
▲	28	O-Ring	262360	262401
▲	29	Back-up Ring	271732	271787

Note: 1 lb. ft. = .74 Nm.
14.5 psi = 1 bar

▲ – Included in seal kit (Table 13)
● – Included in poppet kit 926288
◆ – Included in adjuster rod kit 926227
■ – Not available for sale

Figure 27. Parts Tabulation

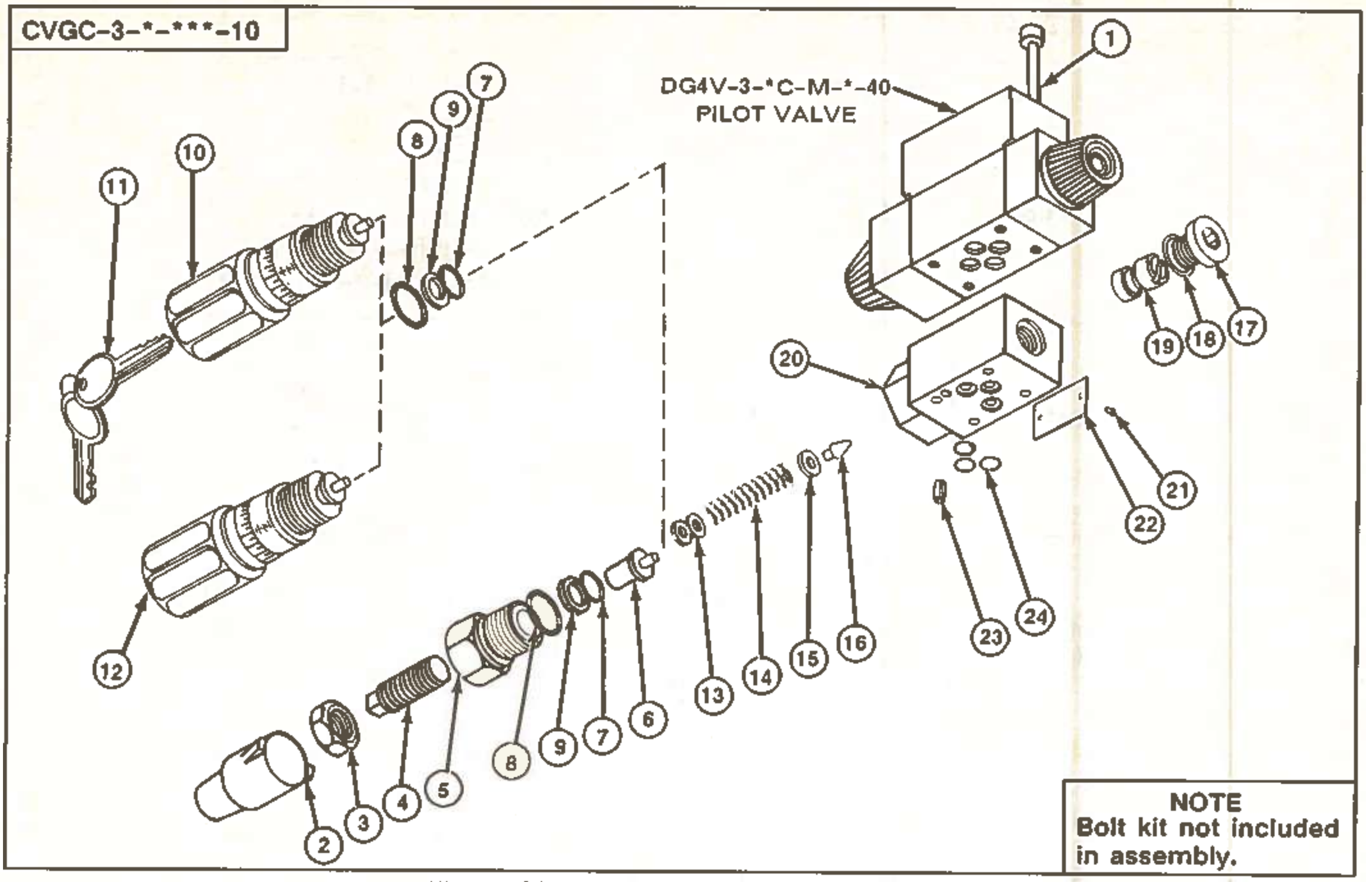


Figure 28. CVGC Pressure Relief Module

Item No.	Part Description	Part No.
1	Bolt kit (See Appendix)	
◆ 2	Cap	762607
◆ 3	Lock Nut	761190
◆ 4	Adjuster Rod	762918
◆ 5	Adaptor	579922
	Torque to (lb. ft.)	(81)
◆ 6	Guide	762919
▲ 7	O-Ring	262350
▲ 8	O-Ring	262355
▲ 9	Back-up Ring	197588
10	Micrometer/key S/A (K)	637463
11	Keys (1 set of 2)	814573
12	Micrometer (M)	637462
● 13	Shims	762920

Item No.	Part Description	Part No.
14	Spring (125 bar)	762928
	Spring (250 bar)	762929
	Spring (350 bar)	762930
● 15	Washer	762921
● 16	Poppet	290057
17	Plug	329463
	Torque to (lb. ft.)	(42)
▲ 18	O-Ring	263497
● 19	Seat	762922
■ 20	Body	580036
21	Screw (2 req'd)	36212
22	Nameplate	199082
23	Pin	472553
▲ 24	O-Ring	262431

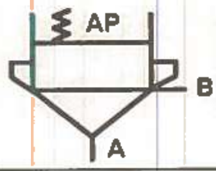
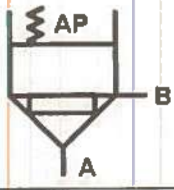
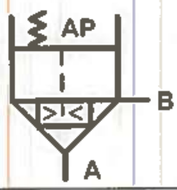
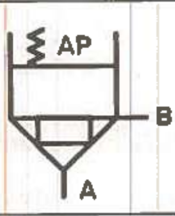
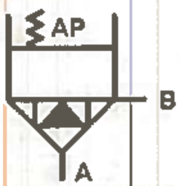
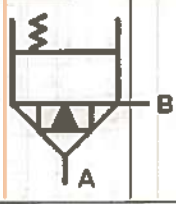
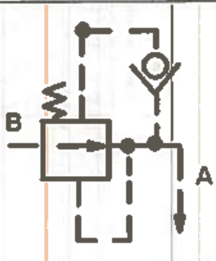
Note: 1 lb. ft. = .74 Nm.
14.5 psi = 1 bar

▲ – Included in seal kit 920258
◆ – Included in adjuster rod kit 941472
● – Included in poppet kit 941473
■ – Not available for sale

Note:
To obtain a complete CVGC module, order by the model code on the nameplate.

Figure 28. Parts Tabulation

C. Cartridge Insert Disassembly & Assembly

Figure Number	Insert Type	Function	Functional Symbol	Insert Model Code
31 33	Directional	D10		CVI-**-D10-2-** CVI-**-D10-2-L-** CVI-**-D10-2-M-** CVI-**-D10-2-H-** CVI-**-D104-2-*-**
31	Directional	D11		CVI-**-D11-2-L-** CVI-**-D11-2-M-** CVI-**-D11-2-H-**
31	Directional with Orifice	D11		CVI-**-D11-2-L-**-** CVI-**-D11-2-M-**-** CVI-**-D11-2-H-**-**
31	Directional	D20		CVI-**-D20-2-L-** CVI-**-D20-2-M-** CVI-**-D20-2-H-**
31	Restrictor	R		CVI-**-R-2-L-** CVI-**-R-2-M-** CVI-**-R-2-H-**
31	Flow Control	F		CVI-**-F-2-L-** CVI-**-F-2-M-** CVI-**-F-2-H-**
32	Pressure Reducing	X		CVI-**-X1-2-**

Perform the following steps. Refer to Figure 16.

1. Remove insert spring and determine the spring cracking pressure. Refer to Section V-C for instructions.

2. Use a suitable extractor and remove the poppet from the sleeve. Apply the extractor tool at the poppet groove as shown in Figure 29.

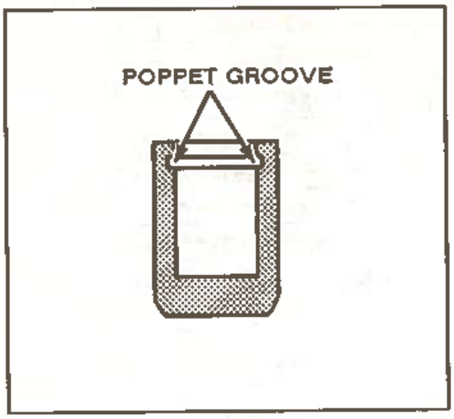


Figure 29. Insert Poppet

3. Determine poppet area ratio. Refer to Section V-C (Figure 17) for instructions.

4. Remove the sleeve from the manifold block. Apply a suitable extractor tool at the groove on smaller valve size (16mm through 32mm) pressure reducing inserts, or at the port holes for other inserts. See Figure 30. Apply the extractor tool to the two tapped holes on larger valve sizes (40mm through 63mm). See Figure 30a.

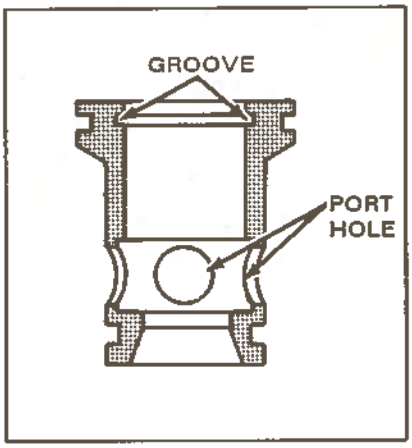


Figure 30a. Insert Sleeve (40, 50, 63mm)

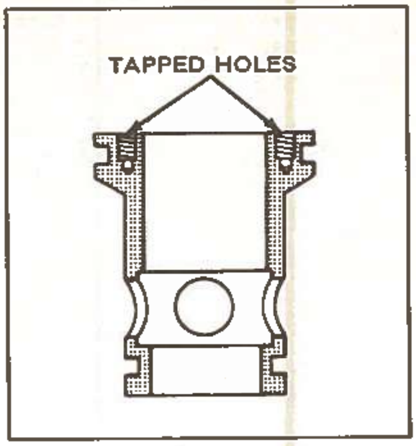


Figure 30. Insert Sleeve (16, 25, 32mm)

5. Determine valve size by measuring largest diameter of sleeve. Refer to the number/letter code stamped on the sleeve or Section V-C.

6. Remove o-rings and back-up rings from sleeve.

7. Inspect insert parts for damage or excessive wear.

8. If required, obtain a new insert kit from Table 11. The insert kit contains a new sleeve, poppet, spring, and seals for the sleeve.

9. Refer to Table 12 if a new insert spring is required.

10. If a new insert kit is not required, obtain a new seal kit from table 13 and install o-rings and back-up rings on the sleeve. The seal kit includes all necessary seals for the sleeve and the cover assembly). Refer to Figure 16 for seal orientation.

11. Lubricate the seals with clean hydraulic fluid. Orient the sleeve port holes with the port holes inside the manifold block. Install the sleeve into the manifold block with a suitable piece of aluminum or nylon.

12. Install the poppet into sleeve.

13. Install the spring into poppet.

Area Ratio	Crack Press. (psi)	Insert Kit Number						Insert Model Code
		16mm	25mm	32mm	40mm	50mm	63mm	
1:1	33.4	995105		—		—	—	CVI-**-D10-2-11
1:1	33.4		995298		995144			CVI-**-D10-2-30
1:1	40.6	—	—	995080	—	—	—	CVI-**-D10-2-11
1:1.1	4.3	580019	580064	815250	589929	598111	589134	CVI-**-D11-2-L-10
1:1.1	20.3	—	—	815241	—	—	—	CVI-**-D11-2-M-10
1:1.1	24.7	580020	580065	—	580026	589112	589135	CVI-**-D11-2-M-10
1:1.1	36.3	580021	580066	—	579931	589113	589136	CVI-**-D11-2-H-10
1:1.1	39.2	—	—	815242	—	—	—	CVI-**-D11-2-H-10
1:2	7.3	580022	580067	815243	579932	589114	589137	CVI-**-D20-2-L-10
1:2	36.3	580023	580068	815244	579933	589115	589138	CVI-**-D20-2-M-10
1:2	72.5	580024	580069	—	579934	589116	589139	CVI-**-D20-2-H-10
1:2	72.5	—	—	815245	—	—	—	CVI-**-D20-2-H-10
1:1.1	4.3	580028	580073	815249	579938	—	—	CVI-**-D11-2-L-10
1:1.1	20.3	—	—	815250	—	—	—	CVI-**-D11-2-M-10
1:1.1	24.7	580029	580074	—	579939	—	—	CVI-**-D11-2-M-10
1:1.1	36.3	580030	580075	815251	579940	—	—	CVI-**-D11-2-H-10
1:2	7.3	580025	580070	815246	579935	589117	589140	CVI-**-F-2-L-10
1:2	36.3	580026	580071	815247	579936	589118	589141	CVI-**-F-2-M-10
1:2	72.5	—	—	—	579937	589119	589143	CVI-**-F-2-H-10
1:2	7.3	675987	676004	479142	676194	455998	456013	CVI-**-R-2-L-10
1:2	36.3	675988	676005	479143	676195	455999	456014	CVI-**-R-2-M-10
1:2	72.5	675989	676006	479144	676196	455997	456012	CVI-**-R-2-H-10
1:1	3.8	995103	995109	—	995108	—	—	CVI-**-D10-2-L-10
1:1	21.7	455919	995110	—	995104	—	—	CVI-**-D10-2-M-10
1:1	32.8	995105	995298	995080	995144	—	—	CVI-**-D10-2-H-10
* 1:104	29.0	—	478545	—	478546	—	—	CVI-**-D104-2-10
		580360	580421					CVI-**-X-2-10

Note: 14.5 psi = 1 bar

* – Use on pressure relief applications that exceed 3600 psi (250 bar).

Table 11. Insert Kits

Area Ratio	Cracking Pressure (psi)	Valve Size/ Insert Spring					
		16mm	25mm	32mm	40mm	50mm	63mm
1:1 1:1.04	3.8 – 4.3	761564	761567	—	761570	—	—
	21.7	761565	761568	—	761571	—	—
	29.0 – 33.4	761566	761569	—	761572	—	—
	36.3	—	—	—	—	763676	—
	40.6	—	—	815222	—	—	—
1:1.1	4.3	761564	761567	815220	761570	763674	763712
	20.3	—	—	815221	—	—	—
	24.7	761565	761568	—	761571	763675	763713
	36.3	761566	761569	—	761572	763676	763714
	39.2	—	—	815222	—	—	—
1:2	7.3	761564	761567	815220	761570	763674	763712
	36.3	761565	761568	815221	761571	763675	763713
	72.5	761566	761569	815222	761572	763676	763714

Note: 14.5 psi = 1 bar

Table 12. Insert Springs

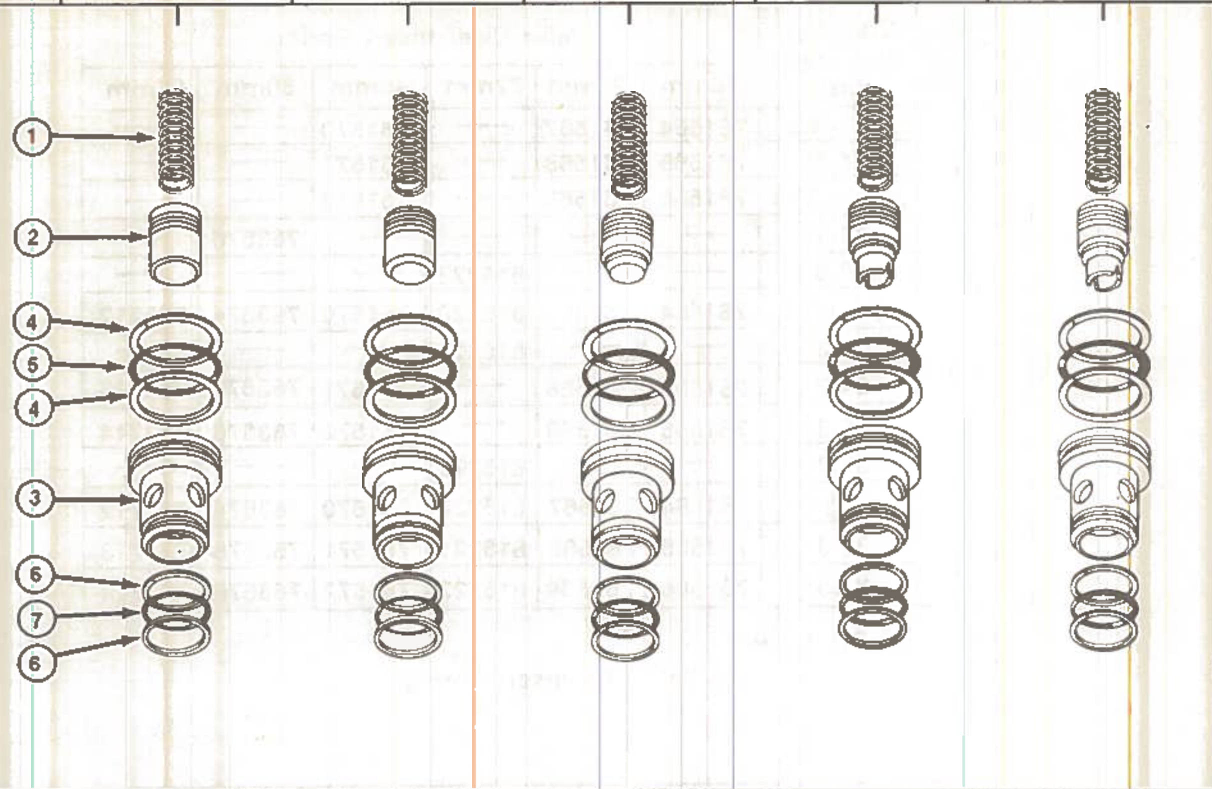
Valve Size (mm)	16	25	32	40	50	63
Seal Kit	920173	920175	920365	920177	920208	920210

NOTE

Replacement seal kits include F3 seals only. Kits include all necessary seals for cartridge insert and cartridge cover assembly on any type of cartridge valve. If a pilot valve is mounted on the cover assembly, refer to Table 3 and obtain the pilot valve seal kit (includes interface seals) from the pilot valve parts drawing.

Table 13. Seal Kits

Function	D10	D11	D20	F	R
Area Ratio	1:1	1:1.1	1:2	1:2	1:2



Item No.	Part Name	Function ▶ Size(mm) ▼	D10	D11	D20	F	R
1	Spring	16–63	See Table 12				
■ 2	Poppet	16	994806	760970	760971	760974	987452
		25	994807	760856	760857	760858	987677
		32	995082	815232	815233	815234	479141
		40	994808	760892	760894	760896	987678
		50	479026	763671	763672	763673	637263
		63	——	763709	763710	763711	637264
■ 3	Sleeve	16	994809	580037	580038	580038	580038
		25	994810	580078	580079	580079	580079
		32	995801	815230	815231	815231	815231
		40	994811	579942	579943	579943	579943
		50	478953	589101	589102	589102	589102
		63	——	589103	589104	589104	589104

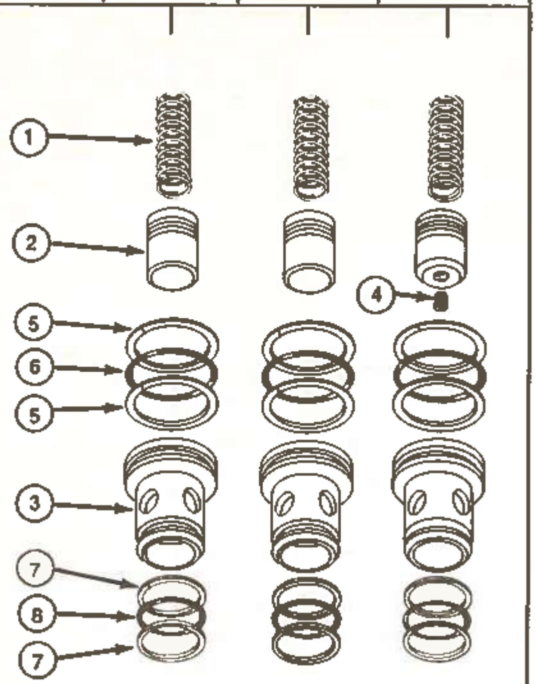
Item No.	Part Name	Valve Size (mm)					
		16	25	32	40	50	63
■▲4	BU-Ring	277652	277707	277712	277716	277781	277790
■▲5	O-Ring	262360	262401	262406	262410	262467	262476
■▲6	BU-Ring	277648	277653	277707	277710	277714	277781
■▲7	O-Ring	262356	262361	262401	262404	262408	262467

▲ – Included in seal kit (Table 13)

■ – Individual insert parts not available for sale. Obtain insert kit noted in Table 11.

Figure 31. Cartridge Insert Parts for Directional, Shuttle & Pilot Operated Check

Function	D10	D104	D11
Area Ratio	1:1	1:1.04	1:1.1 (w/Orifice)



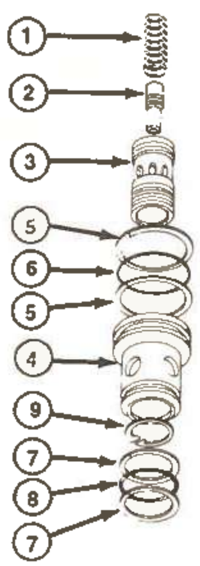
Item No.	Part Name	Size (mm)	Function		
			D10	D104	D11
1	Spring	16-40	See Table 12		
■ 2	Poppet	16	994806	—	761910
		25	994807	478543	761911
		32	995082	—	815236
		40	994808	478544	761912
■ 3	Sleeve	16	994809	—	580037
		25	994810	994810	580078
		32	995801	—	815230
		40	994811	994811	579942

Item No.	Part Name	Valve Size (mm)			
		16	25	32	40
	Orifice Dia. (mm)	1.0	1.2	1.2	1.4
■ * 4	Orifice (Std.)	986032	986037	986037	815407

Item No.	Part Name	Valve Size (mm)			
		16	25	32	40
■▲ 5	Back-up Ring	277652	277707	277712	277716
■▲ 6	O-Ring	262360	262401	262406	262410
■▲ 7	Back-up Ring	277648	277653	277707	277710
■▲ 8	O-Ring	262356	262361	262401	262404

▲ - Included in seal kit (Table 13)
■ - Individual insert parts not available for sale. Obtain insert kit noted in Table 11.
* - This orifice has metric threads. Refer to European service drawings (Table 2) for other orifice sizes.

Figure 32. Cartridge Insert Parts for Pressure Relief & Unloading



Item No.	Part Name	Valve Size (mm)	
		16	25
1	Spring	764166	764309
■-⊖-2	Check Valve S/A	764134	764134
■ 3	Spool	764164	764307
■ 4	Sleeve	580366	580432
■▲ 5	Back-up Ring	277652	277707
■▲ 6	O-Ring	262360	262401
■▲ 7	Back-up Ring	277648	277653
■▲ 8	O-Ring	262356	262361
■ 9	Retaining Ring	92757	103989

▲ - Included in seal kit (Table 13)
■ - Individual insert parts not available for sale. Obtain insert kit noted in Table 11.
-⊖- Do not remove. Check valve S/A is bonded into spool with special compound.

Figure 33. Cartridge Insert Parts for Pressure Reducing

APPENDIX

The following diagrams (Figures 34, 35 and 36) illustrate various cartridge valve arrangements and related bolt kits for cartridge valves with pilot valve interface covers.

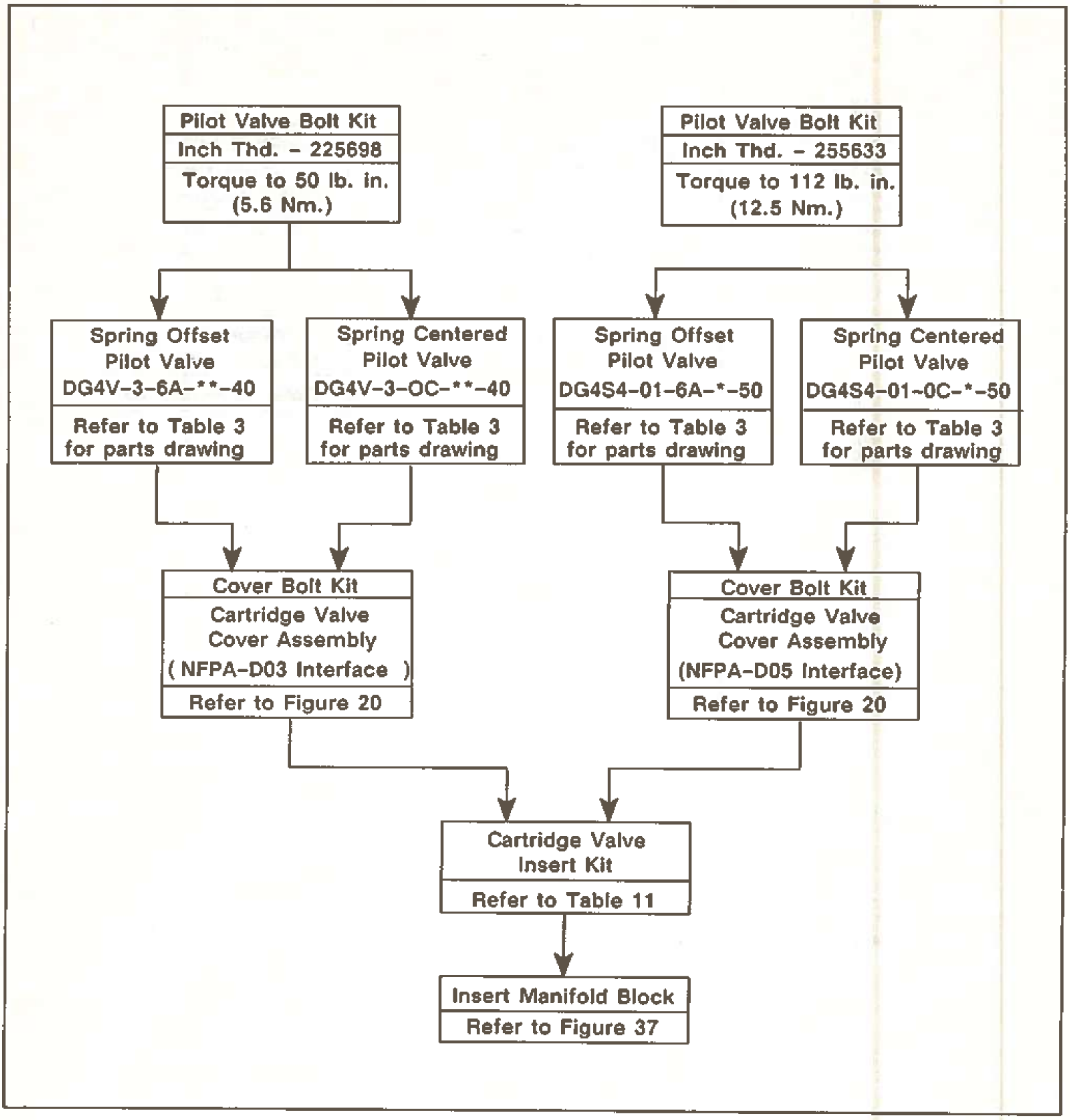


Figure 34. Cartridge Valve Arrangement for Directional Cover (NFPA-D03/D05)

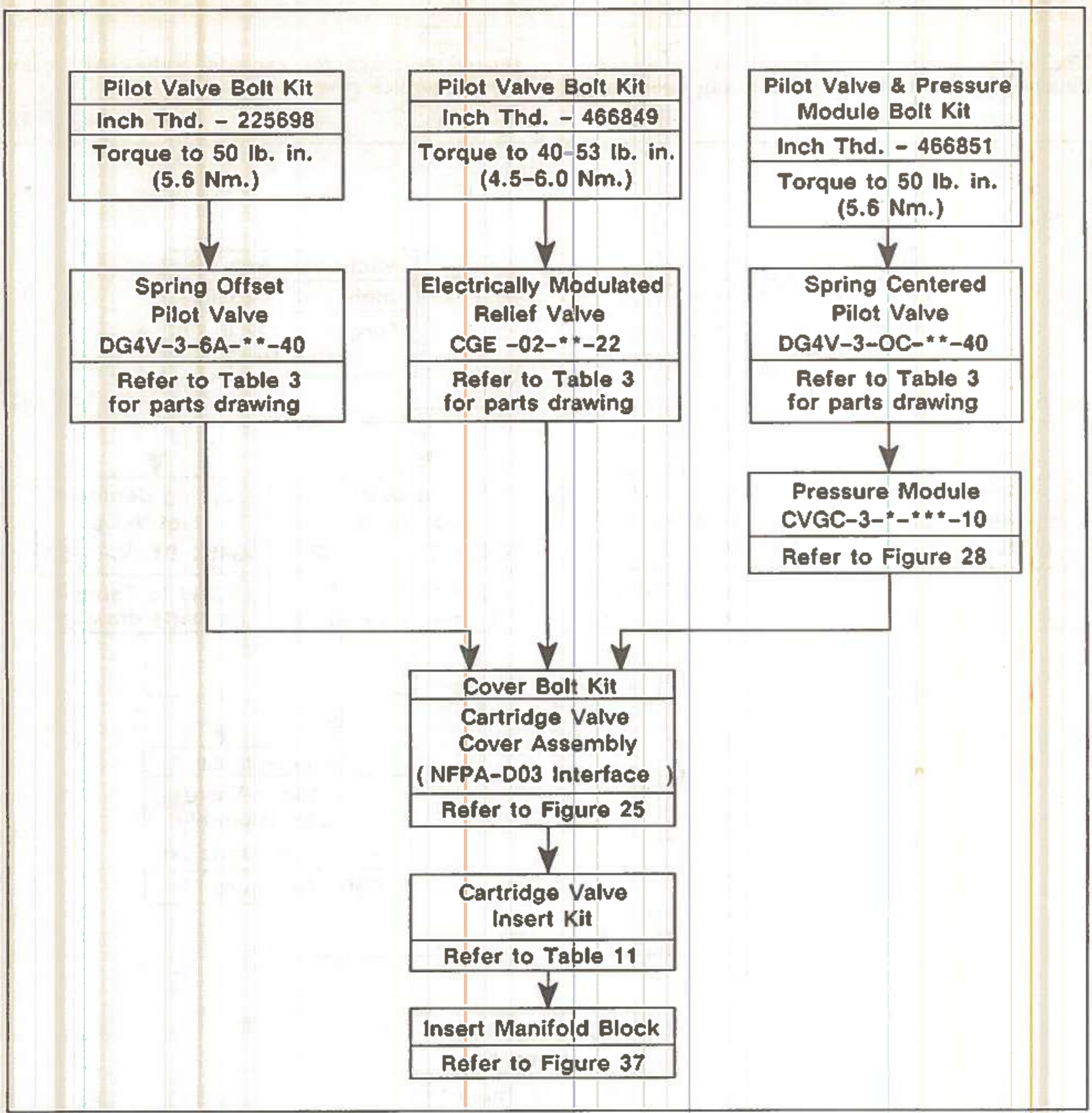


Figure 35. Cartridge Valve Arrangement for Pressure Relief Cover (NFPA-D03)

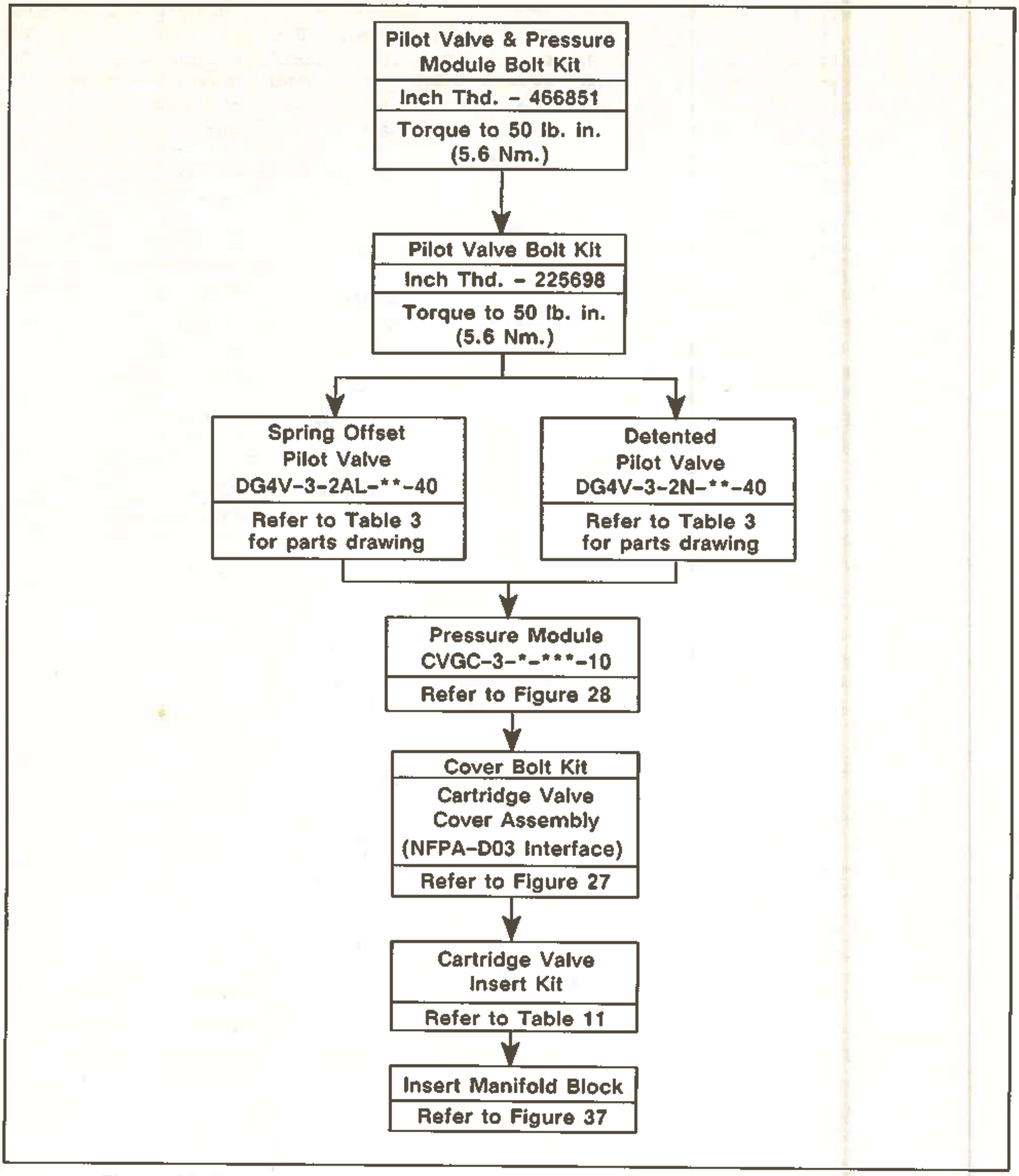
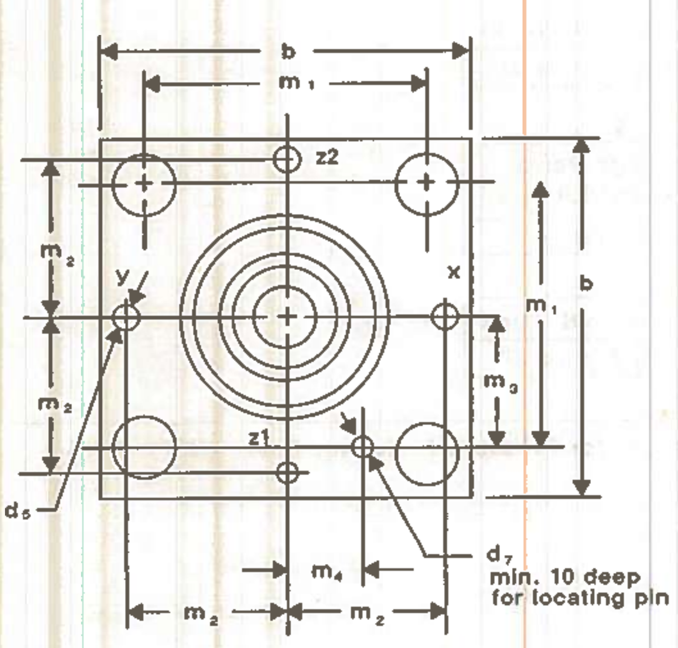


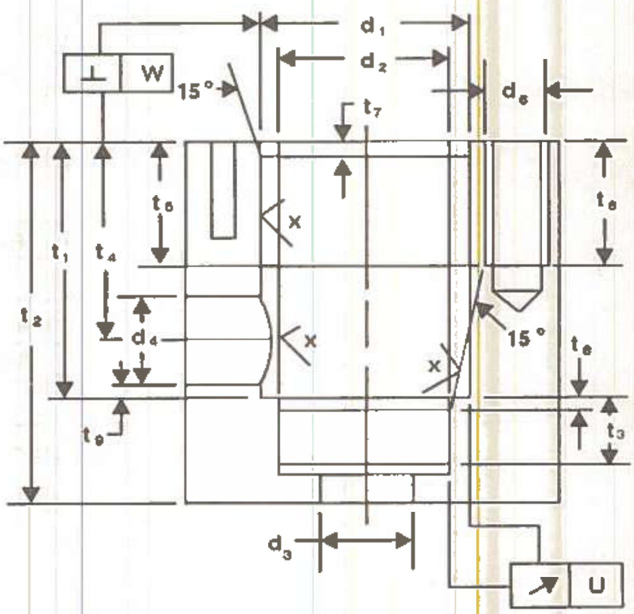
Figure 36. Cartridge Valve Arrangement for Pressure Reducing Cover (NFPA-D03)

Manifold Block – Recess Dimensions to DIN 24342

Dimension	Nominal Size – Metric (Inches)					
	16mm	25mm	32mm	40mm	50mm	63mm
b	65(2.56)	85(3.35)	102(4.01)	125(4.92)	140(5.51)	160(7.09)
d_1 min.	32.000(1.2598)	45.000(1.7717)	60.000(2.3622)	75.000(2.9528)	90.000(3.5433)	102.000(4.7244)
max.	32.025(1.2608)	45.025(1.7726)	60.030(2.3633)	75.030(2.9539)	90.035(3.5447)	120.035(4.7258)
d_2 min.	25.000(0.9843)	34.000(1.3386)	45.000(1.7716)	55.000(2.1653)	68.000(2.6772)	90.000(3.5433)
max.	25.021(0.9851)	34.025(1.3396)	45.030(1.7727)	55.030(2.1665)	68.030(2.6783)	90.035(3.5447)
d_3 max.	16(.63)	25(.98)	32(1.26)	40(1.57)	50(1.97)	63(2.48)
d_4 min.	16(.63)	25(.98)	32(1.26)	40(1.57)	50(1.97)	63(2.48)
max.	25(.98)	32(1.26)	40(1.57)	50(1.97)	63(2.48)	80(3.15)
d_5 max.	4(.157)	6(.236)	8(.314)	10(.393)	10(.393)	12(.472)
d_6 max. Thd.	M8	M12	M16	M20	M20	M30
	(.3125-18)	(.500-13)	(.6250-11)	(.750-10)	(.750-10)	(1.250-7)
d_7 + 0.2(+.008)	4.000(.1575)	6.000(.2362)	6.000(.2362)	6.000(.2362)	8.000(.3150)	8.000(.3150)
	4.180(.1646)	6.180(.2433)	6.180(.2433)	6.180(.2433)	8.220(.3236)	8.220(.3236)
m_1 + 0.2(+.008)	46(1.811)	58(2.284)	70(2.755)	85(3.347)	100(3.937)	125(4.921)
m_2 + 0.2(+.008)	25(.984)	33(1.299)	41(1.614)	50(1.969)	58(2.284)	75(2.953)
m_3 + 0.2(+.008)	23(.906)	29(1.142)	35(1.377)	42.5(1.674)	50(1.969)	62.5(2.461)
m_4 + 0.2(+.008)	10.5(.414)	16(.630)	17(.669)	23(.906)	30(1.181)	38(1.496)
t_1 + 0.1(+.004)	43(1.692)	58(2.283)	70(2.755)	87(3.425)	100(3.937)	130(5.118)
t_2 + 0.1(+.004)	56(2.204)	72(2.834)	85(3.346)	105(4.133)	122(4.803)	155(6.103)
t_3*	11(.433)	12(.472)	13(.511)	15(.590)	17(.669)	20(.787)
t_4	34(1.338)	44(1.732)	52(2.047)	64(2.519)	72(2.834)	95(3.740)
t_4 to d_4 max.	29.5(1.161)	40.5(1.594)	48(1.889)	59(2.322)	65.5(2.578)	86.5(3.405)
t_5*	20(.787)	30(1.181)	30(1.181)	30(1.181)	35(1.377)	40(1.574)
t_6 Thd. Depth	20(.787)	25(.984)	35(1.377)	35(1.377)	40(1.574)	55(2.165)
t_7	2(.078)	2.5(.098)	2.5(.098)	3(.118)	4(.157)	4(.157)
t_8	2(.078)	2.5(.098)	2.5(.098)	3(.118)	3(.118)	4(.157)
t_9	1.5(.059)	1.5(.059)	1.5(.059)	3(.118)	3(.118)	3(.118)
t_{11} max.	25(.98)	31(1.220)	42(1.653)	53(2.086)	53(2.086)	75(2.953)
U	0.03(.0012)	0.03(.0012)	0.03(.0012)	0.05(.0020)	0.05(.0020)	0.05(.0020)
W	0.05(.0020)	0.05(.0012)	0.1(.0039)	0.1(.0039)	0.1(.0039)	0.2(.0079)
XRa	1.6 micrometre(63 microinches)					

* Depth of finish "XRa" in hole.





STANDARD ORIFICE LOCATIONS

CVC16 ORIFICE LOCATION

MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-16-A-S2-*-10	XX	XX	XX	1.0	XX	XX
CVC-16-C-S2-****-10	XX	1.2	XX	0.8	-	XX
CVC-16-C1-S2-****-10	XX	1.2	-	0.8	-	XX
CVC-16-D1-S2-10	1.0	-	XX	-	-	-
CVC-16-N-S2-10	XX	XX	XX	1.0	XX	XX
CVC-16-PC-S2-10	XX	1.0	XX	XX	XX	XX
CVC-16-U-S2-****-10	XX	1.2	XX	-	-	XX
CVC-16-U1-S2-****-10	XX	1.2	-	-	-	XX
CVC-16-W-S2-10	XX	1.0	XX	XX	XX	-
CVC-16-W11-S2-10	1.0	-	XX	XX	XX	-
CVC-16-W21-S2-10	1.0	-	XX	XX	XX	-
CVC-16-W31-S2-10	1.0	-	PLUG	-	XX	XX
CVC-16-X-S2-****-10	XX	-	XX	-	-	XX
CVC-16-X1-S2-****-10	XX	-	-	-	-	XX

CVC25 ORIFICE LOCATION

MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-25-AD1-S2-*-10-NC	1.2	XX	PLUG	XX	XX	XX
CVC-25-AD1-S2-*-10-NO	PLUG	XX	1.2	XX	XX	XX
CVC-25-A-S2-*-10	XX	XX	XX	1.2	XX	XX
CVC-25-C-S2-****-10	XX	1.2	-	0.8	-	XX
CVC-25-C1-S2-****-10	XX	1.2	-	0.8	-	XX
CVC-25-D1-S2-10	1.2	-	XX	-	-	-
CVC-25-N-S2-10	XX	XX	XX	1.2	XX	XX
CVC-25-PC-S2-10	XX	1.2	XX	XX	XX	XX
CVC-25-U-S2-****-10	XX	1.2	XX	-	-	XX
CVC-25-U1-S2-****-10	XX	1.2	-	-	-	XX
CVC-25-W-S2-10	XX	1.2	XX	XX	XX	-
CVC-25-W11-S2-10	1.2	-	XX	XX	XX	-
CVC-25-W21-S2-10	1.2	-	XX	XX	XX	-
CVC-25-W31-S2-10	1.2	-	PLUG	-	XX	XX
CVC-25-X-S2-****-10	XX	-	XX	-	-	XX
CVC-25-X1-S2-****-10	XX	-	-	-	-	XX

CVC32 ORIFICE LOCATION

MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-32-A-S2-W-10	XX	XX	XX	1.3	XX	XX
CVC-32-C-S2-****-10	XX	1.4	XX	0.9	-	XX
CVC-32-C1-S2-****-10	XX	1.4	-	0.9	-	XX
CVC-32-D1-S2-10	1.3	-	XX	-	-	-
CVC-32-N-S2-10	XX	XX	XX	1.3	XX	XX
CVC-32-PC-S2-10	XX	1.3	XX	XX	XX	XX
CVC-32-U-S2-****-10	XX	1.2	XX	-	-	XX
CVC-32-U1-S2-****-10	XX	1.3	-	-	-	XX
CVC-32-W-S2-10	XX	1.3	XX	XX	XX	-
CVC-32-W11-S2-10	1.3	-	XX	XX	XX	-
CVC-32-W21-S2-10	1.3	-	XX	XX	XX	-
CVC-32-W31-S2-10	1.3	-	PLUG	-	XX	XX

CVC40 ORIFICE LOCATION

MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-40-AD1-S2-W-10-NC	1.4	XX	PLUG	XX	XX	XX
CVC-40-AD1-S2-W-10-NO	PLUG	XX	1.4	XX	XX	XX
CVC-40-A-S2-W-10	XX	XX	XX	1.4	XX	XX
CVC-40-C-S2-****-10	XX	1.5	XX	1.0	-	XX
CVC-40-C1-S2-****-10	XX	1.5	XX	1.0	-	XX
CVC-40-D1-S2-10	XX	-	XX	-	-	-
CVC-40-N-S2-10	1.4	XX	XX	1.4	XX	XX
CVC-40-PC-S2-10	XX	1.4	XX	XX	XX	XX
CVC-40-U-S2-****-10	XX	1.4	XX	-	-	XX
CVC-40-U1-S2-****-10	XX	1.4	-	-	-	XX
CVC-40-W-S2-10	XX	1.4	XX	XX	XX	-
CVC-40-W11-S2-10	1.4	-	XX	XX	XX	-
CVC-40-W21-S2-10	1.4	-	XX	XX	XX	-
CVC-40-W31-S2-10	1.4	-	PLUG	-	XX	XX

CVC50 ORIFICE LOCATION

MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-50-A-S2-W-10	XX	-	XX	1.6	XX	XX
CVC-50-D2-S2-10	XX	1.6	XX	-	-	-
CVC-50-N-S2-10	XX	-	XX	1.6	XX	XX

CVC63 ORIFICE LOCATION

MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-63-A-S2-W-10	XX	-	XX	1.8	XX	XX
CVC-63-D2-S2-10	XX	1.8	XX	-	-	-
CVC-63-N-S2-10	XX	-	XX	1.8	XX	XX

Example: XX = Orifice location not available 1.2 = Standard orifice (mm) location
- = Optional orifice location PLUG = Solid Plug

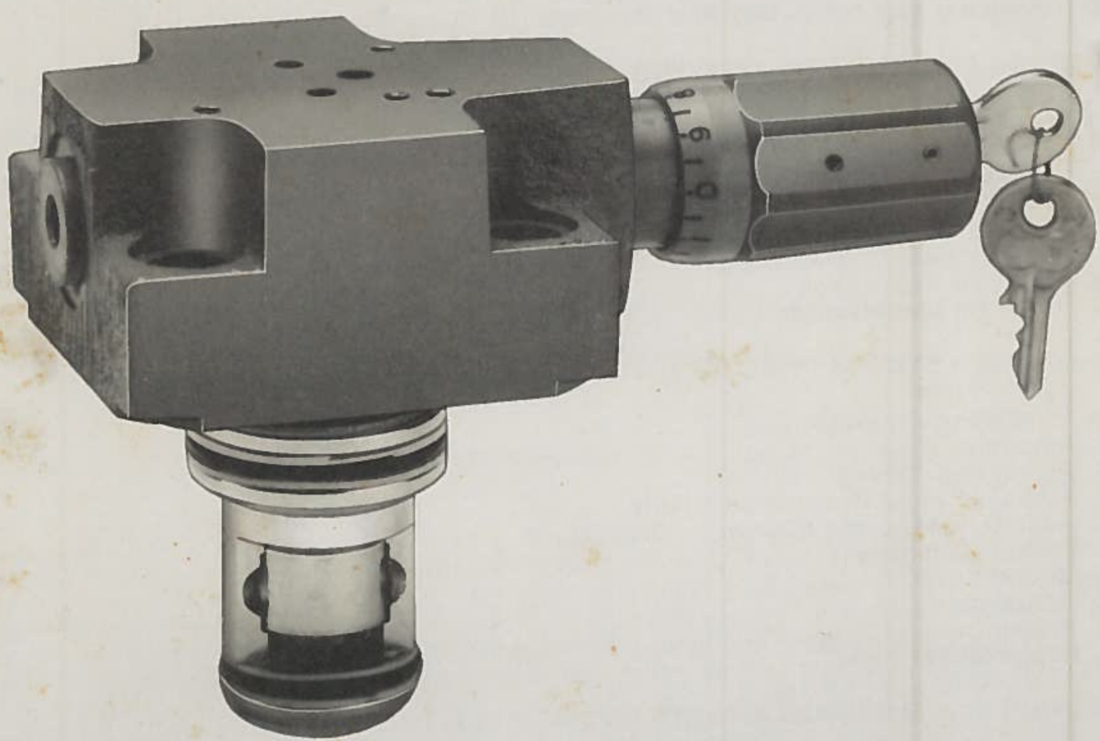
4 (479)

VICKERS®
A TRINOVA COMPANY

Overhaul Manual

CVCS SERIES
CVI SERIES
CARTRIDGE
VALVE
COVERS &
INSERTS

CVCS – Directional Valves
CVCS – Pressure Relief Valves
CVCS – Pressure Reducing Valves



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APPENDIX 45

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SECTION I – GENERAL INFORMATION & UNIT DESCRIPTION

A. Purpose of Manual

This manual describes basic operating characteristics and service and overhaul information for slip-in cartridge type valves. Section I provides unit description and unit identification information. Sections II, III and IV provides information on the directional, pressure relief and pressure reducing cover assembly. Section V provides information on cartridge valve inserts. Section VI provides installation and system inspection information and Section VII provides overhaul and parts information. The Appendix provides additional information on cartridge valve arrangements, bolt kits, standard orifice plug locations and manifold block dimensions.

B. General Unit Description

The cartridge valve consists of two sections – the valve cover assembly and the valve insert kit. The cover controls a particular function while the insert serves as the working section. Cartridge valve covers are mounted to a manifold block with four cap screws. The cover retains the valve insert within the manifold block cavity. Cartridge valves are available in **16, 25, 32, 40, 50** and **63** millimeter sizes. The cartridge valve size represents the nominal manifold block port size. Figure 1 illustrates a typical cartridge valve arrangement.

C. Unit Identification/Model Code

Figure 2 shows a cartridge valve nameplate that is located at the valve cover. The model code identifies the type of cartridge valve cover (CVCS) assembly. In the past, these slip-in type cartridge valves were identified with the model code CVC.

D. Model Designation Change

To conform to the Draft International Standard (DIS #7368), these valves are now offered under the model code CVCS. The interfacing of these valves remains the same as before under CVC. The internal porting in the cover has changed for the "D1", "PC", "W", and "W11," in all sizes. All other versions remain the same (i.e. "N", "D2",

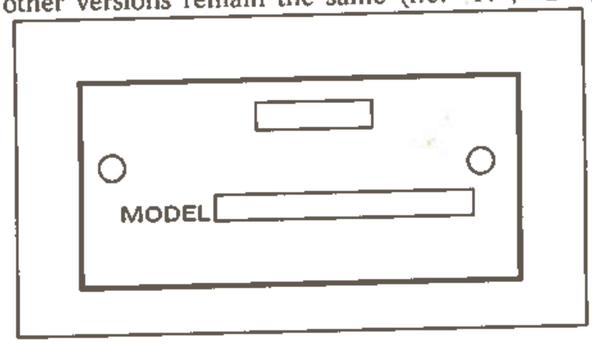


Figure 2. Nameplate

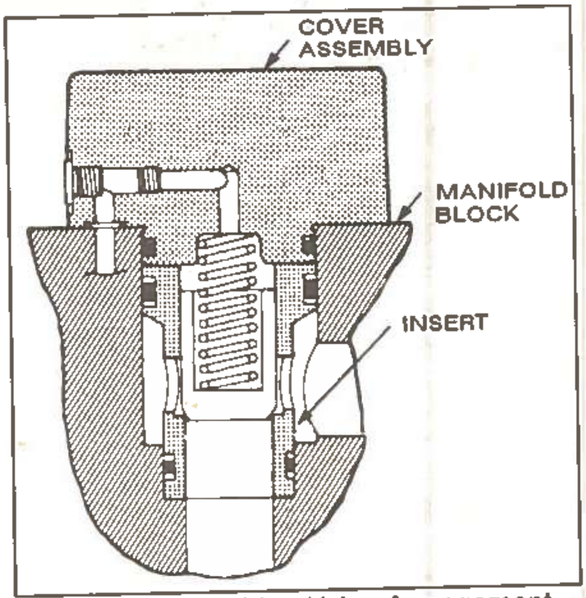


Figure 1. Cartridge Valve Arrangement

"W31", "A", "AD1", "C", "C1", "U", "X" and "X1."

NOTE

> When replacing a CVC with a CVCS using the "D1" and "W11" functions, the pilot valve must be reoriented as detailed below.

The second part of this change involves pilot valve orientation. For example, on current CVC versions of the "D1" cover, the "b" solenoid of the pilot valve lined up over the "Z1" interface port of the cover. Under the CVCS, it will line up over the "y" port. The only covers that change the pilot valve axis orientation are the "D1" and "W11." Refer to the model code (Table 1) to identify the characteristics of the cover assembly. Note that the cover assembly has SAE threads (includes plugs and orifices).

The cartridge valve insert (CVI) kit has been identified by a model number mounted on the manifold. See Figure 2a. The code identifies the insert valve size, function and the design. Refer to the model code (Table 1a) to identify the characteristics of the cartridge valve insert kit. Note that the

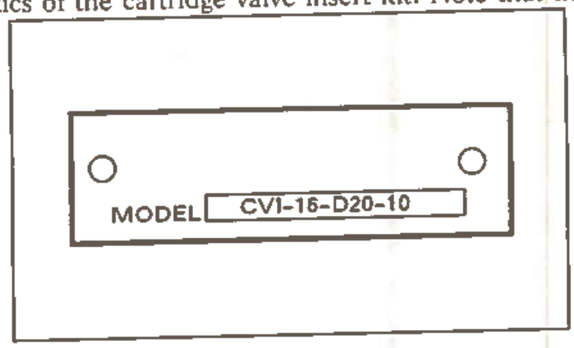


Figure 2a. Insert Identification

insert valve size and the cover size are the same. If the code is not stamped on the insert sleeve, refer to Section V–C to identify the type of insert kit.

If *'Made in England'* is stamped on the nameplate, the cover assembly is part of a cartridge valve unit (CVU). The CVU consists of a cartridge valve cover (CVCS) assembly and a cartridge valve insert (CVI) kit. If this is the case, refer to Table 2 and select the appropriate installation and parts drawings. Note that the cover assembly has metric threads (includes plugs and orifices).

Cartridge Valve Type	Installation Drawing	Parts Drawing
Directional	GB–V–1501	S–F–40556
Pilot Operated Check	GB–V–1501	S–F–40557
Shuttle	GB–V–1501	S–F–40557
Pressure Relief	GB–V–1502	S–F–40558
Pressure Reducing	GB–V–1503	S–F–40559

Table 2. European Service Drawings for CVU Cartridge Valves

NOTE
Refer to Table 8 for CVCS Installation Drawings

MODEL CODE BREAKDOWN

(F3) -CVCS - ** - ** - ** - **** - 10 - (*) - (N*) - (****)

1 2 3 4 5 6 7 8 9 10 11

1 Special Seals
Seals for mineral oil & fire resistant fluids.

2 Cartridge Valve Cover
Conforms to ISO DIS #7368 ▲

3 Cartridge Valve Size (mm)
16, 25, 32, 40, 50, 63

4 Function
Directional Valve
N,D1,D2,PC,W, W11,W31,A,AD1
Pressure Relief
C,C1,U,U1
Pressure Reducing
X,X1

5 Plugs, Seals, Bolts

Plugs	B – BSP Thd. (Europe)	
	S – SAE Thd. (USA)	
Seals	1 – DIN 3770 (Europe)	
	2 – ISO 3601 (Europe & USA)	
Bolts	9 – Metric (Europe)	
	Blank – Without bolts (USA)	

6 Adjuster Mechanism
(A,AD1,C,C1,U,U1,X,X1 Only)
M – Micrometer Knob
K – Micrometer Knob with key lock
W – Rod with lock nut

7 Adjuster Pressure Range
(C,C1,U,U1,X,X1 Only)
125 3 – 125 bar (44–1800 psi)
245 5 – 245 bar (72–3550 psi)
350 8 – 350 bar (116–5000 psi)

8 Design

9 Model Suffix
For special features

10 -AD1 Function
(Omit for other cover types)
NC – Normally Closed
NO – Normally Open

11 Orifice Location/Size*
(Omit if not required)
X08 – 0.8mm orifice @ 'X' port
Z112 – 1.2mm orifice @ 'Z1'port
AP99 – No orifice in 'AP' port
Z200 – Solid plug @ 'Z2' port

* Orifices may be removed or added to the cartridge valve cover to fine tune the system. If the model code on the cover nameplate has a letter/number code after the design, orifices are installed into specific port locations, different from the standard assembly. Example: -10-X08 indicates an 0.8mm orifice is installed into the 'X' port, within the cover. Orifices may be installed in the 'X', 'Z1', 'Z2', 'P', 'A', 'B' and 'AP' port, depending on cover type and application. Refer to the Appendix for standard orifice locations and sizes for each cartridge valve cover.

▲ These cartridge covers are in accordance with ISO draft international standard #7368. This cover internal porting changes to the D1, PC, W and W11 covers from prior published information.

Table 1. Model Code for Cartridge Valve Cover (CVCS)

MODEL CODE BREAKDOWN

(F3) – CVI – ** – *** – 2 – * – ** – (*) – (**)

1 2 3 4 5 6 7 8 9

1 Special Seals

Seals for mineral oil & fire resistant fluids.

2 Cartridge Valve Insert

3 Cartridge Valve Size (mm)

4 * Function

D10 (1:1)	C,C1
D11 (1:1.1)	N
D11 with orifice	U,U1
D20 (1:2)	D1,D2,N,PC,W, W11, W31
F (1:2)	A,AD1
R (1:2)	N,D1,D2
X1	X,X1

5 Seals

1 – DIN 3770 (Europe)
2 – ISO 3601 (Europe & USA)

6 Spring Cracking Pressure bar (psi)

Type	L	M	H
D10	Blank	Blank	2.0(30)
D11	0.3(4)	1.4(20)	2.7(39)
D20	0.5(7)	2.5(36)	5.0(72)
F	0.5(7)	2.5(36)	5.0(72)
R	0.5(7)	2.5(36)	5.0(72)

Blank – No letter code used.

7 Design

Valve Size (mm)						Function
16	25	32	40	50	63	
-11	-30	-11	-30	-10	-10	D10
-10	-10	-10	-10	-10		D11/D20/F/R
-10	-10					X1

8 Model Suffix

For special features

9 Orifice 'AX'

(D11 with orifice only)

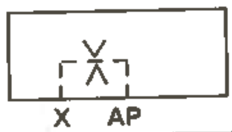
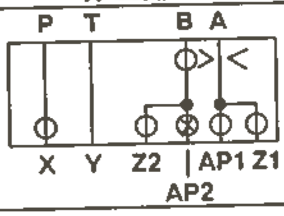
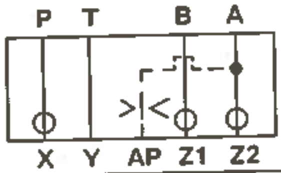
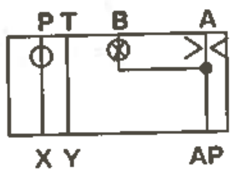
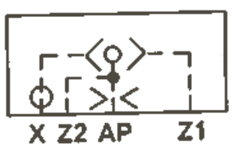
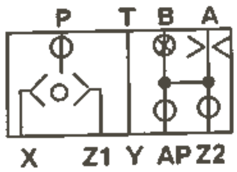
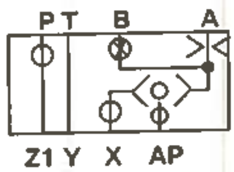
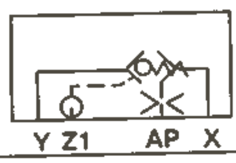
08 – 0.8mm
10 – 1.0mm
12 – 1.2mm
14 – 1.4mm
16 – 1.6mm
18 – 1.8mm
20 – 2.0mm

* – Most common insert/cover combinations

Table 1a. Model Code for Cartridge Valve Insert (CVI)

SECTION II – DIRECTIONAL COVERS

The function of the directional cover assembly is to direct flow from one port to another. Eight types of directional covers are available. The typeof directional cover used depends upon application requirements. The eight types of directional covers and their respective functional symbols are listed below. Under the CVCS model change the internal porting in the "W11" cover, T goes to Y instead of Z1 and in the "PC' option, Z1 is now the control port instead of the X port.

Cover Type	Functional Symbol	Size (mm)
N Directional		16, 25, 32, 40, 50, 63
A Directional with Stroke Adjuster		16, 25, 32, 40, 50, 63
D1 Directional with NFPA-D03/D05 Pilot Interface		16, 25, 32, 40
D2 Directional with NFPA-D03/D05 Pilot Interface		50, 63
AD1 Directional with NFPA-D03 Pilot Interface & Stroke Adjuster ('NC' shown)		25, 40
W Shuttle		16, 25, 32, 40
W11 Shuttle with NFPA-D03 Pilot Interface		16, 25, 32, 40
W31		
PC Pilot Operated Check		16, 25, 32, 40

A. Directional (N Function)

This directional cover assembly is available in **16, 25, 32, 40, 50** and **63mm** size. The directional cover assembly (shown in Figure 3) contains a pilot pressure passage with an orifice to control the opening and closing rate of the poppet that is located within the cartridge insert. The poppet is controlled by an externally operated pressure source. With sufficient pressure at pilot port 'X', the poppet is closed and flow between 'A' and 'B' port is blocked. The poppet moves upward and flow is from port 'A' to port 'B' when the 'X' port is drained to tank. The amount of pressure required to move the poppet depends upon the insert area ratio and the spring force. Flow is created from 'B' port to 'A' port when the 'X' port is connected to tank and pressure at 'B' port exceeds the pressure at 'A' port plus the equivalent pressure of the spring force. The standard directional cover operation is shown in Figure 3a.

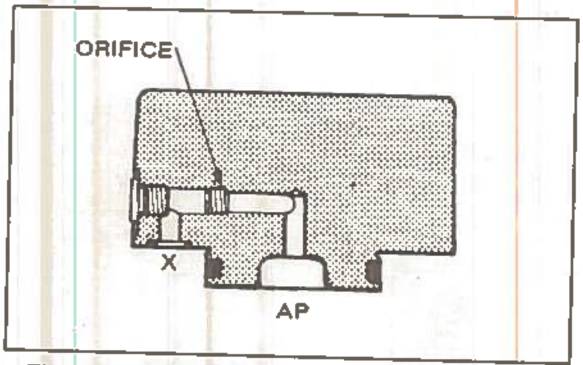


Figure 3. Directional Cover (N Function)

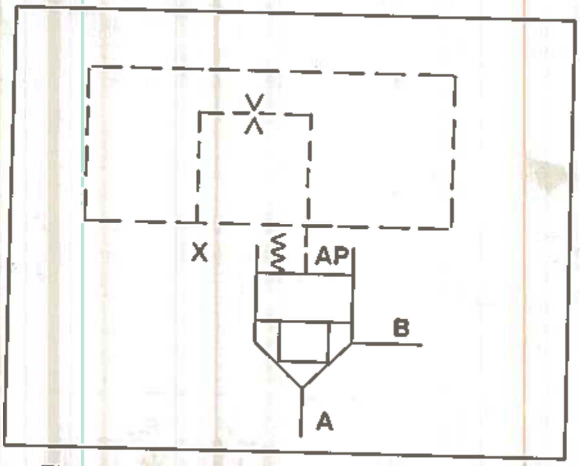


Figure 3a. Directional Cover Operation

B. Directional with Stroke Adjuster (A Function)

This cover assembly is available in **16, 25, 32, 40, 50,** and **63mm** size. The cover assembly provides directional control and flow regulation in a single unit. Flow regulation is obtained by limiting the travel or stroke of the insert poppet. The throttle opening is set by the position of a rod which extends into the cartridge insert spring chamber. The rod forms a stop to prevent the poppet from fully opening.

Three types of adjustments are available – locknut (W), the micrometer (M), and micrometer with key lock (K). Refer to Figure 4 for the basic locknut adjustment (W) arrangement (W only on 50 and 63mm sizes). The micrometer adjuster provides precise control with the capability of returning to a previous pressure setting when desired. The three adjuster types are described in more detail in Section VII.

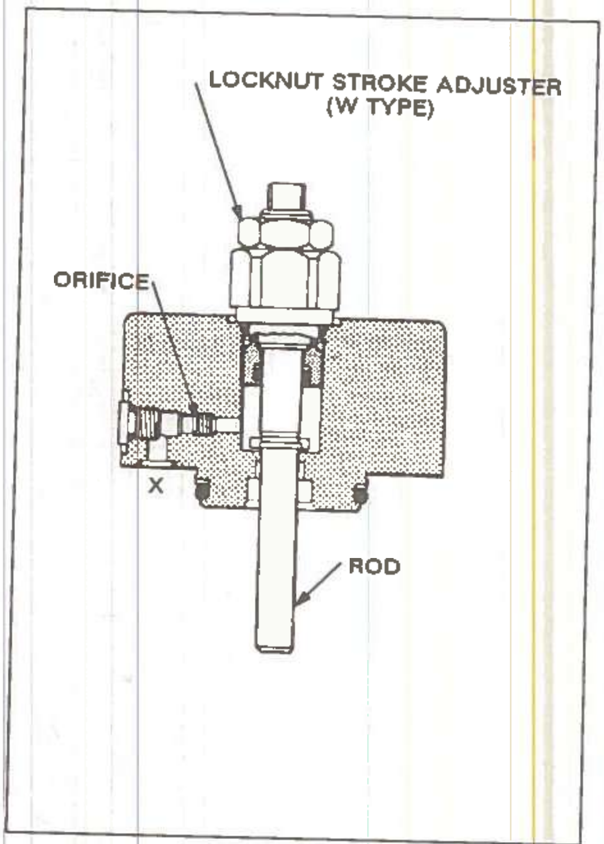


Figure 4. Directional Cover with Stroke Adjuster (A Function)

C. Directional with NFPA-D03/D05 Pilot Interface (D1 & D2 Function)

This type of cover assembly is available in 16, 25, 32, 40, 50 and 63mm size. The 16, 25, 32 and 40mm covers have a NFPA-D03 interface for mounting a DG4V-3 pilot valve. See Figure 5. The 50mm and 63mm covers have a NFPA-D05 interface for mounting a DG4S4-01 pilot valve. See Figure 5a. Refer to Table 3 for pilot valve information. The difference between the two cover sizes is the interface porting relationship to ports 'Z1' and 'Z2'. The integrally mounted pilot valve provides a compact, convenient package for pressure source switching to control the opening and closing of the insert poppet.

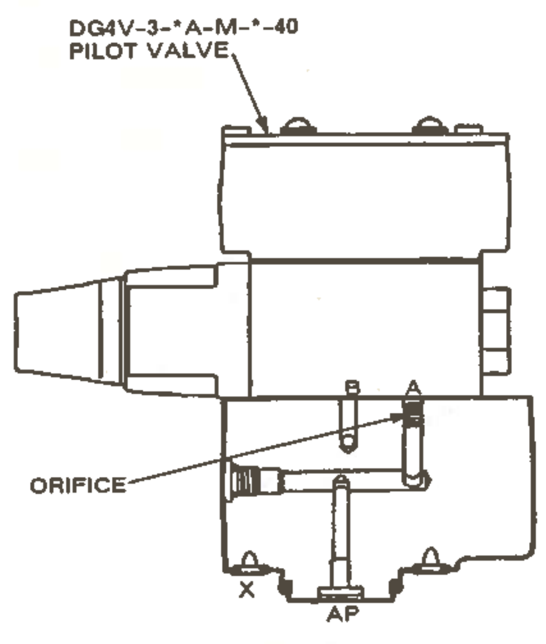


Figure 5. Directional Cover with ISO-4401-03/NFPA-D03 Pilot Interface (Formerly NFPA-D01) 'D1' Function

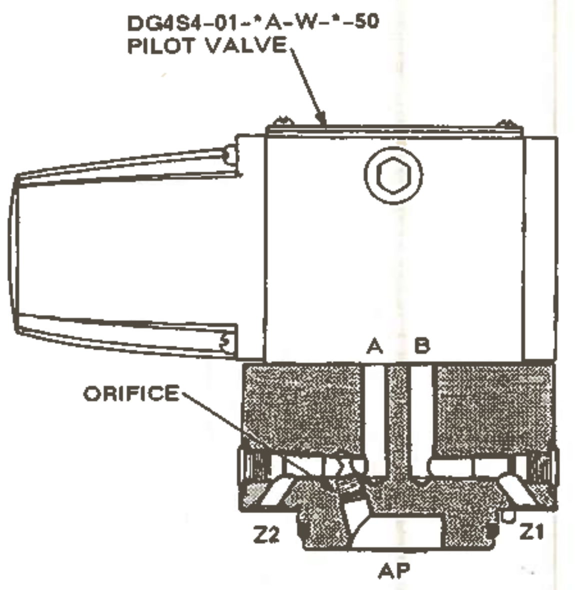


Figure 5a. Directional Cover with ISO-4401-05/ NFPA-D05 Pilot Interface (Formerly NFPA-D02) 'D2' Function

NFPA-D03 INTERFACE			NFPA-D05 INTERFACE		
Model	Parts Drawing	Installation Drawing	Model	Parts Drawing	Installation Drawing
DG4V-3-*A-40	I-3861-S	517351	DG4S4-01-*A-W-50	I-3557-S	517410
DG4V-3-*B-40	I-3862-S		DG4S4-01-*B/C-W-50	I-3558-S	
DG4V-3-*C-40	I-3863-S		DG4S4-01-*N-W-50	I-3559-S	
DG4V-3-*F-40	I-3864-S		DG4S4-01-*A-50	I-3478-S	517401
DG4V-3-*N-40	I-3865-S		DG4S4-01-*C-50	I-3477-S	
			DG4S4-01-*N-51	I-3471-S	

Table 3. Pilot Valve Information

D. Directional Cover with NFPA-D03 Pilot Interface and Stroke Adjuster (AD1 Function))

This type of cover combines the pilot interface and stroke adjuster feature. The pilot valve switches pressure to or from the 'AP' port to open or close the poppet. The flow is then regulated by the stroke adjuster to a desired flow rate. This type of cover combination is only available in the 25 and 40mm valve size. With the pilot valve de-energized, the insert poppet is normally open when a solid plug is installed at the 'A' port and an orifice plug is installed at the 'B' port of the cover (interface location). The insert poppet is normally closed when the solid plug and orifice plug location is reversed (ie. orifice plug installed at 'A' port and a solid plug installed at 'B' port). Figure 6 illustrates the AD1 cover mounted to a DG4V-3 pilot valve. Figure 6a shows the AD1 cover operation.

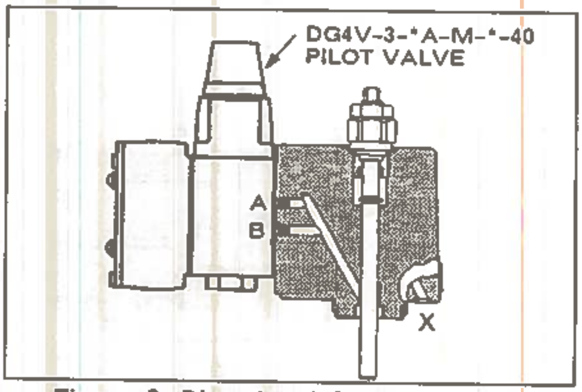


Figure 6. Directional Cover with Pilot Interface & Stroke Adjuster (AD1 Function)

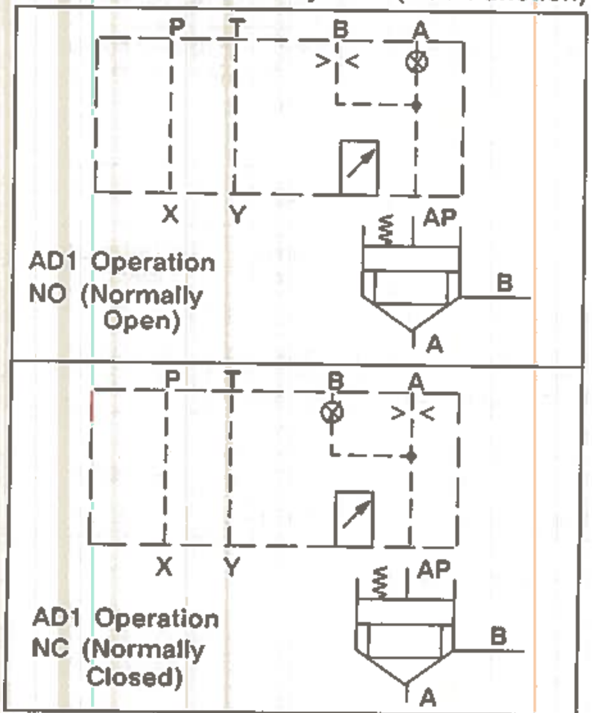


Figure 6a. AD1 Cover Operation

E. Shuttle (W Function)

This shuttle cover assembly is available in the 16, 25, 32 and 40mm size. The shuttle cover will take the higher of two pressures and direct it into the pilot spring area (AP) of the cartridge valve insert. Orifices are available in the cover to control reaction time of the poppet. A seat is pressed into the cover bore and a ball is inserted. The outer plug is then installed into the cover. The outer plug retains the ball and seat between the spring area (AP) and the 'Z1' port. The outer plug also has an o-ring and back-up ring to prevent leakage between the (AP) and 'Z1' port areas. Figure 7 shows the construction of a shuttle cover (W function) assembly. The shuttle valve operation is illustrated in Figure 7a.

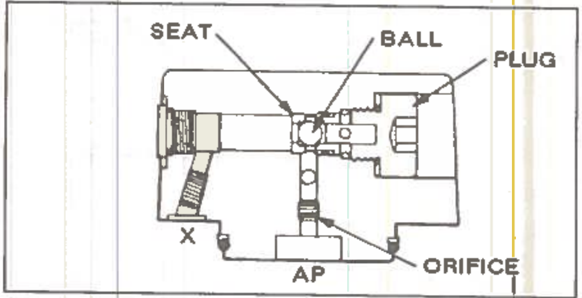


Figure 7. Shuttle Cover Assembly (W Function)

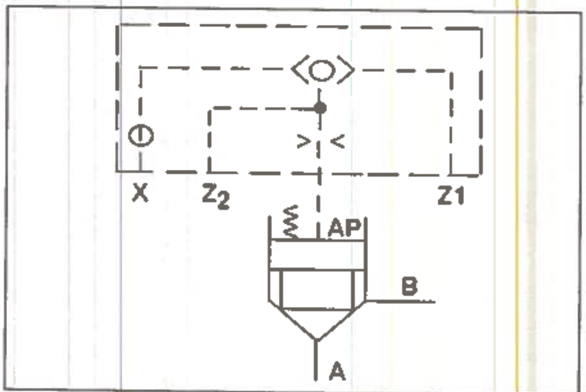


Figure 7a. Shuttle Valve Operation (W Function)

F. Shuttle / NFPA-D03 Pilot Interface (W11, & W31 Function)

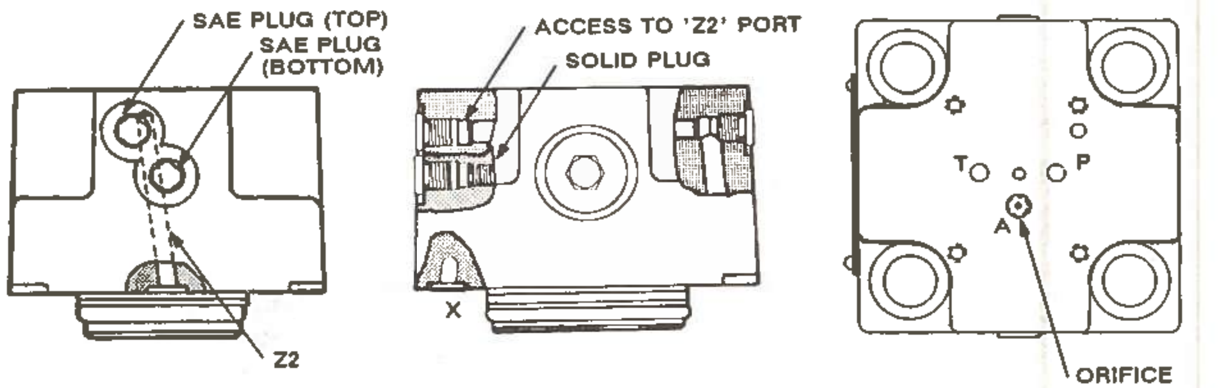
Shuttle covers that have the NFPA-D03 pilot interface are available in the 16, 25, 32 and 40mm sizes. Pilot interface shuttle covers have two configurations: type W11 and W31.

In the W11 cover, when the pilot valve solenoid is de-energized, the cartridge is shut by the higher of the pressures at 'X' or 'Y'. Pilot port 'Z2' can be used to simultaneously pilot a second cartridge.

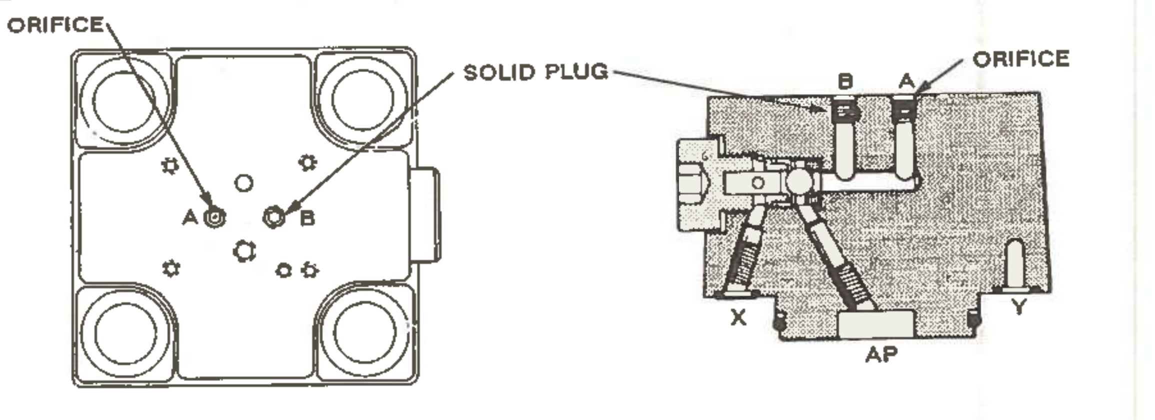
In the 16mm size (W11 Function), the solid plug is located behind the top SAE plug. In the 25, 32 and 40mm size (W11 Function), the solid plug is located behind the bottom SAE plug.

Type W31 cover is completely different. Its function is to provide a non-reverse flow check, eliminating the need for a separate back flow check. This is achieved by the installation of a solid plug in the 'B' port and an orifice in the 'A' port of the interface.

Figure 8 illustrates the two types of shuttle cover configurations and their respective plug locations. Refer to Figure 23 and 23a for parts breakdown. Refer to Table 3 for pilot valve drawings.



Shuttle Cover (W11 Function) (25mm Shown)



Shuttle Cover (W31 Function) (32mm Shown)

Figure 8. Shuttle Cover Construction (NFPA-D03 Pilot Interface) (W11, W31 Function)

Figure 8a illustrates the operation of the shuttle valve for the W11 and W31 functions.

G. Pilot Operated Check (PC Function)

The pilot operated check cover assembly is available in the 16, 25, 32 and 40mm size. Figure 9 shows the construction of a pilot operated check cover. Three pilot ports are used:

- The 'Z1' port is drilled in the manifold block to the pilot signal.
- The 'X' port is drilled in the manifold block to connect with the 'B' port of the insert.
- The 'Y'port is normally connected to a drain line or tank port.

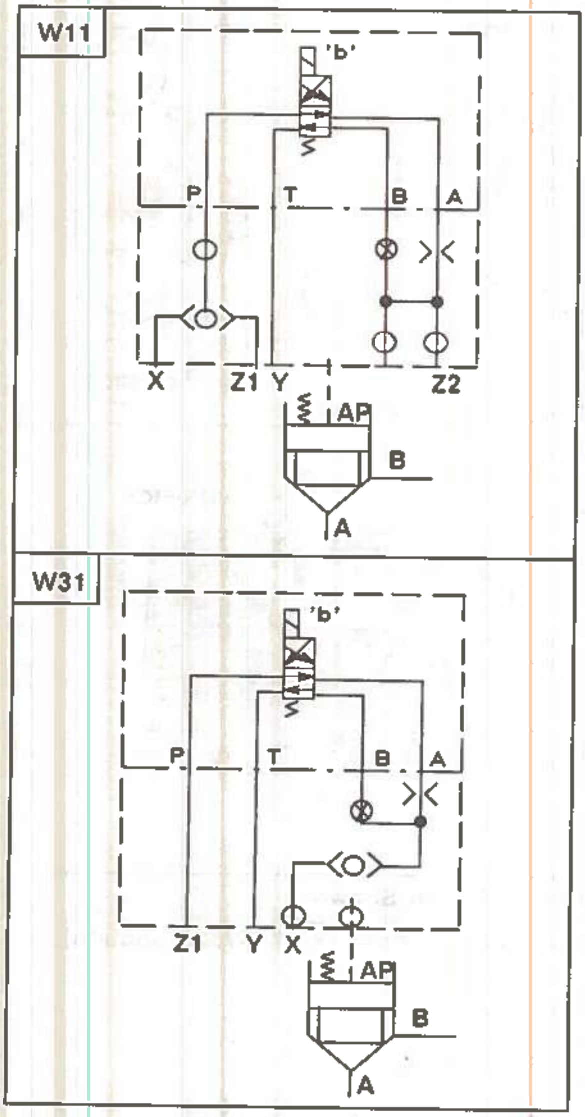


Figure 8a. Shuttle Cover Operation (W11 and W31 Functions)

A simple check valve is created when there is no signal at the 'Z1' port. Flow can pass from 'A' to 'B' if the pressure in the 'A' port is greater than the pressure in the 'B' port plus the spring force. Flow is blocked from 'B' to 'A'. See Figure 9a.

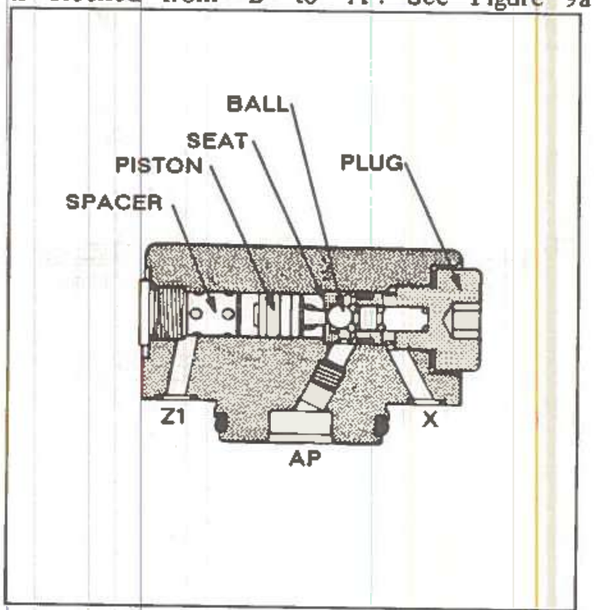


Figure 9. Pilot Operated Check Cover (PC Function)

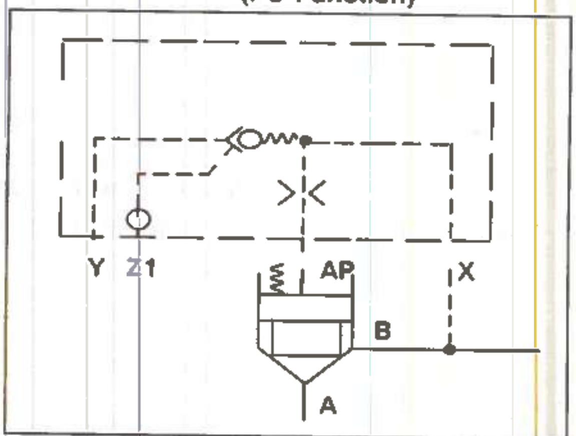
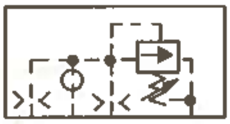
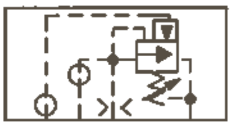
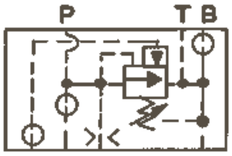


Figure 9a. Pilot Operated Check Operation

SECTION III – PRESSURE RELIEF COVERS

Model coding is now CVCS but no internal porting has changed.

The pressure relief cover assembly is used to limit system pressure to a desired pressure setting. The pressure setting is determined by the cover spring force and the adjuster mechanism position. Pressure relief covers are available in the **16, 25, 32** and **40mm** size. Four types of pressure relief covers are available. The pressure relief covers and their respective functions and sizes are listed below.

Cover Type	Functional Symbol	Size (mm)
C Pressure Relief		16,25, 32,40
C1 Pressure Relief with NFPA-D03 Pilot Interface		16,25, 32,40
U Unloading		16,25, 32,40
U1 Unloading with NFPA-D03 Pilot Interface		16,25, 32,40

A. Pressure Relief (C Function)

This pressure relief cover assembly is available in the **16, 25, 32,** and **40mm** size. The cover assembly (shown in Figure 10) consists of a seat, piston, spring, orifice plugs, seals, and a pressure adjuster mechanism. The adjuster mechanism may be the basic locknut, the micrometer, or the micrometer with keylock type.

Figure 10a illustrates the operation of the pressure relief valve. The orifice plug at the (AP) area dampens the reaction time of the insert poppet and prevents instability. When system pressure at the 'A' port area exceeds the pressure at the (AP) area, the insert poppet lifts off its seat and allows flow from 'A' port to 'B' port (tank). This relieves system pressure at the 'A' port.

Venting the valve by opening 'Z1' to tank will permit flow to occur from 'A' to 'B' at low pressure. Vent pressure will be equivalent to the spring force on the cartridge poppet plus any back pressure present in the vent line. The 'AP' area is connected internally within the cover to the 'Z1' port.

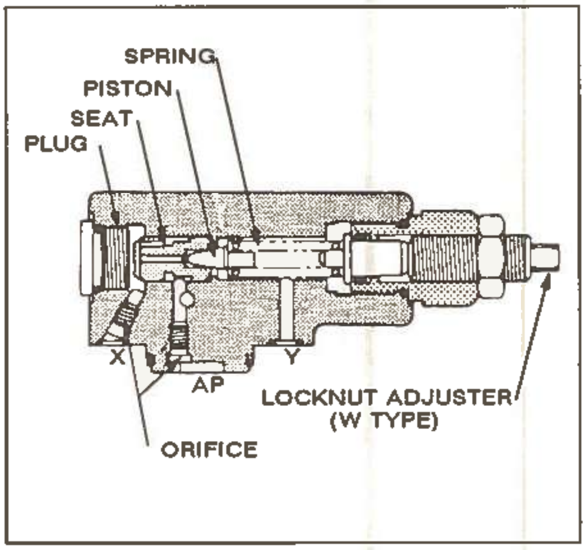


Figure 10. Pressure Relief Cover (C Function)

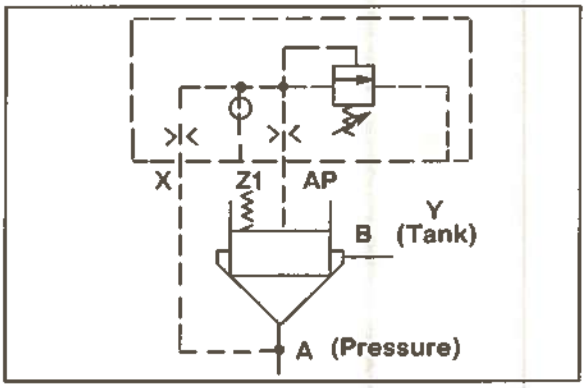


Figure 10a. Pressure Relief Operation

B. Pressure Relief Cover with NFPA-D03 Pilot Interface (C1 Function)

This cover assembly (shown in Figure 11) is available in the **16, 25, 32,** and **40mm** size and is used for mounting a pilot valve such as a **DG4V-3-**-40** or **CGE-02-**-22.** The cover functions like the standard relief except the pressure from 'A' is either blocked or directed to tank by the pilot valve. See Figure 11a. When the pilot valve solenoid is de-energized, the relief valve is vented to tank. The relief valve operates at its relief valve pressure setting, when the pilot valve solenoid is energized. The 'Z1' port is a remote vent connection. Block the 'Z1' port if the remote vent feature is not used.

NOTE

If a **CGE-02** pilot valve is used, install a solid plug into the top of relief valve cover at the 'B' port location to avoid external leakage. See Table 10 for orifice kits. Refer to parts drawing I-3695-S and installation drawing 519205 for CGE-02 applications.

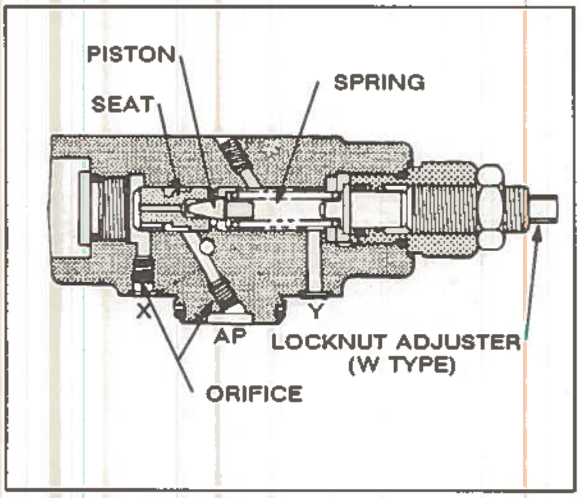


Figure 11. Pressure Relief Cover with Pilot Interface (C1 Function)

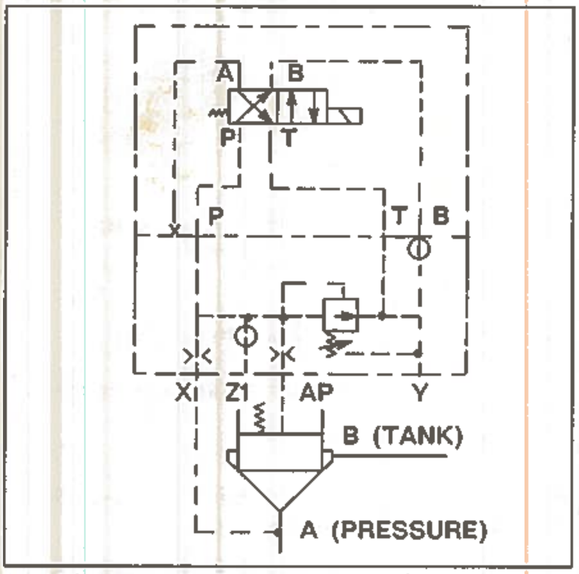


Figure 11a. Pressure Relief Operation with Pilot Interface

A pressure relief module (CVGC-3-*-**-10) may be installed between the pilot valve and the relief valve cover on 16, 25, 32 and 40mm cartridge valves. The CVGC-3 module is used on applications that require both a low and high pressure relief setting. Figure 11b illustrates a cartridge valve arrangement with the pressure relief module. Refer to Table 4 for the pressure relief module model code breakdown. In all applications, the highest pressure setting is controlled by the cover and the lower pressure setting is controlled by the CVGC -3 module.

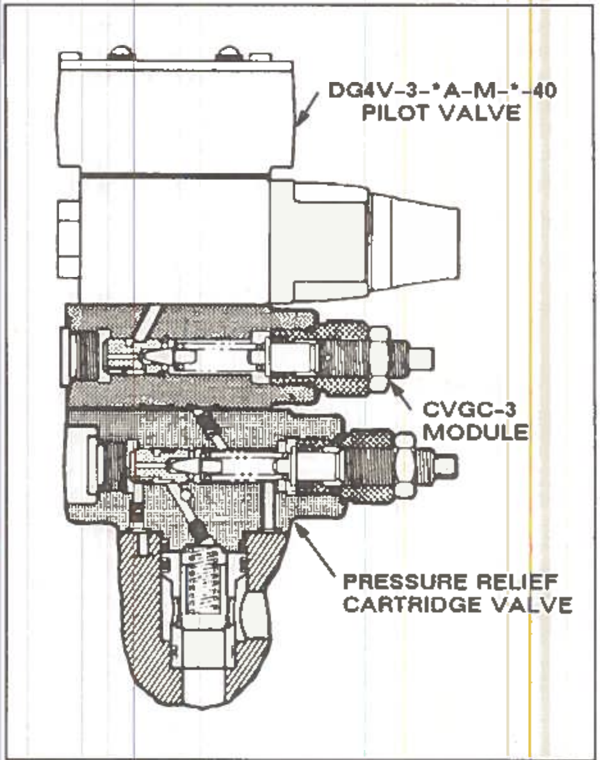


Figure 11b. Pressure Relief Cartridge Valve with Pressure Relief Module for Dual Pressure Control

CVGC-3-*-*-10**

- Pressure Relief Module
- ISO-4401-03 (NFPA-D03) Interface
- Adjuster type
  - W – Locknut
  - M – Micrometer
  - K – Micrometer & keylock
- Pressure Range
  - 125 – 43-1800 psi
  - 245 – 72-3550 psi
  - 350 – 116-5000 psi
- Design

CVGC-3-*-***-10 available for use with C1, X1 and U1 covers only.

Note: 14.5 psi = 1 bar

Table 4. Model Code for Pressure Relief Module

C. Unloading (U Function)

This type of cover assembly is similar to the pressure relief cover. Available sizes are **16, 25, 32** and **40mm**. The valve is unloaded when the pressure at the 'X' port reaches 85% of the the relief pressure setting. The 'X' port is independent of the other ports. Venting is controlled through the 'Z1' port. System pressure is sensed through the 'AX' orifice in the insert poppet. Figure 12 shows the construction of the unloading cover. Figure 12a illustrates the unloading valve operation.

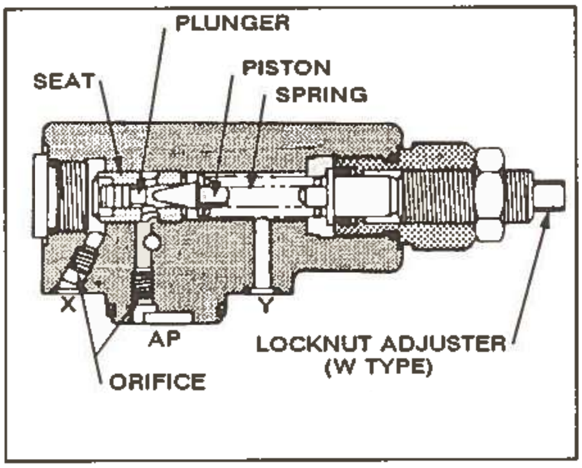


Figure 12. Unloading Cover (U Function)

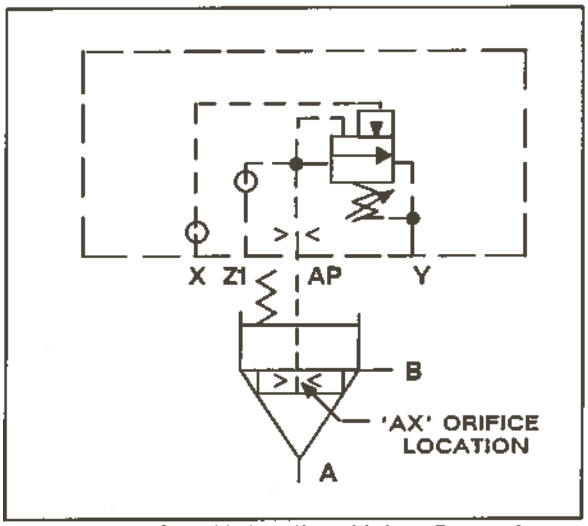


Figure 12a. Unloading Valve Operation

D. Unloading with NFPA-D03 Pilot Interface (U1 Function)

This type of cover assembly is available in the **16, 25, 32** and **40mm** size. When the pilot valve solenoid is energized, system pressure is at the maximum level set by the adjuster on the cartridge cover. The unloading function is controlled through the 'X' port. System pressure is vented to tank when the pilot valve solenoid is de–energized. Figure 13 shows the construction of the cover assembly. Figure 13a illustrates the unloading operation with a pilot valve. Note that the insert poppet has an 'AX' orifice.

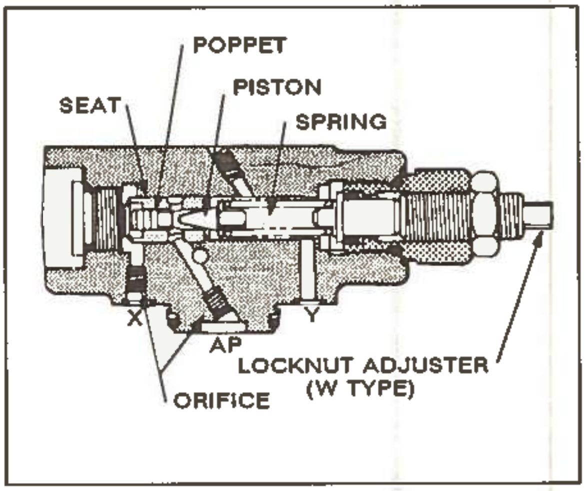


Figure 13. Unloading Cover with NFPA-DO3 Interface (U1 Function)

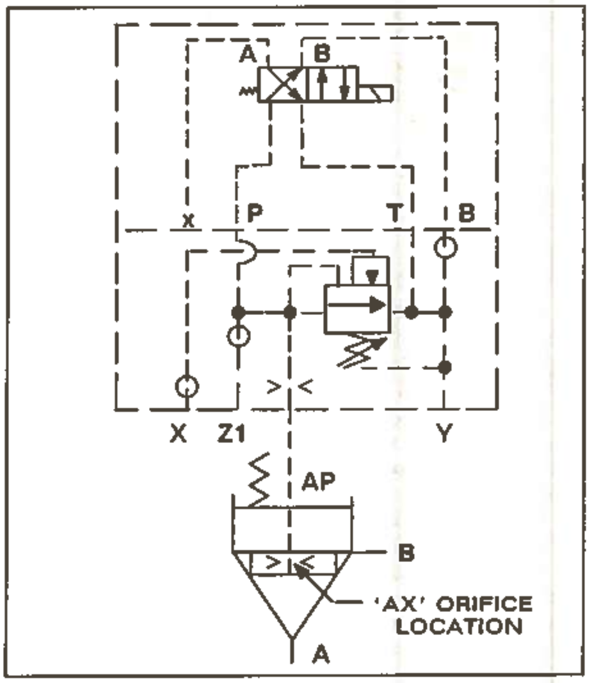
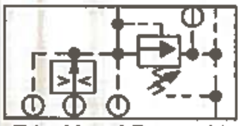


Figure 13a. Unloading Operation with Pilot Valve

SECTION IV – PRESSURE REDUCING COVERS

Model coding is now CVCS but no internal porting has changed.

The function of the pressure reducing cover assembly is to provide a constant outlet pressure that is below inlet pressure. Two types of pressure reducing covers are available. The pressure reducing covers and their respective functions and sizes are listed below.

Cover Type	Functional Symbol	Size (mm)
X Pressure Reducing		16, 25
X1 Pressure Reducing/ NFPA-D03 Pilot Interface		16, 25

A. Pressure Reducing (X Function)

Pressure reducing covers are assembled without orifices unless specified by a model code suffix.

Figure 14 shows the construction of a pressure reducing cover assembly. The cover consists of a seat, piston, spring, flow control, seals, and a pressure adjuster mechanism. This cover assembly is available in the 16 and 25mm size.

Figure 14a shows the operation of a pressure reducing valve. The 'B' port is connected to the pressure source. The 'B' port and 'X' port are interconnected within the manifold block. System pressure ('B' port) is fed to the 'X' port to the flow control. The flow control maintains a constant flow across the poppet independent of the flow from 'B' (p1) to 'A' (p2). When load pressure rises at the 'A' port, the insert spool moves to restrict flow to the load. If load pressure drops below the cracking pressure within the cover, the insert spring will move the insert poppet to increase flow through the valve to the 'A' port and increases the pressure in the 'A' port to the desired reducing pressure setting.

A check valve is located within the insert poppet to relieve pressure peaks at the load. Outlet pressure will drop to its minimum pressure setting when 'Z1' port is vented.

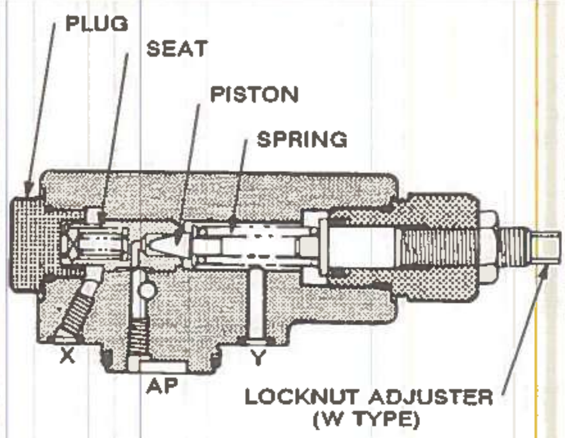


Figure 14. Pressure Reducing Cover (X Function)

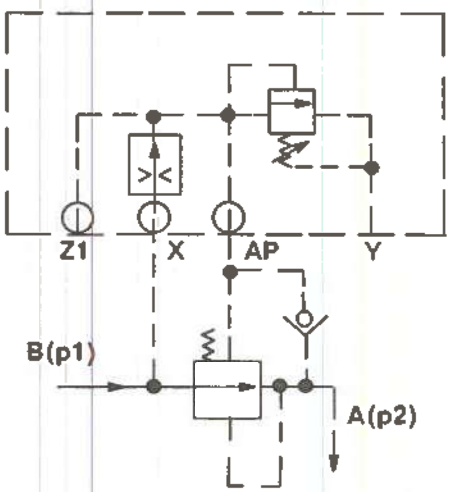


Figure 14a. Pressure Reducing Operation

B. Pressure Reducing with NFPA-D03 Pilot Interface (X1 Function)

This cover assembly (shown in Figure 15) is available in the 16 and 25mm size. This type of cover assembly has an NFPA-D03 interface for mounting a **DG4V-3-*AL-40** pilot valve, a **CGE-02** pilot valve, or a CVGC-3-10 pressure relief module. The pilot valve provides an integral control of the low or high reduced pressure setting. Pressure reducing operation with a pilot valve is shown in Figure 15a.

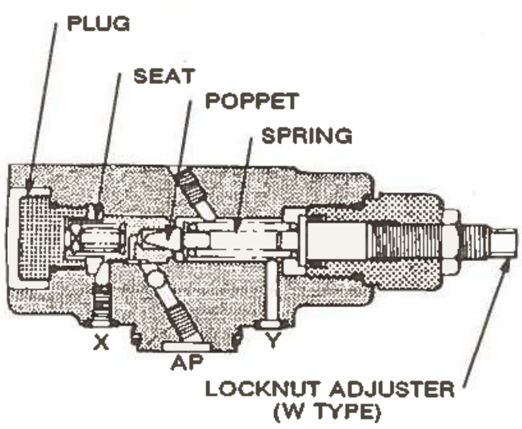


Figure 15. Pressure Reducing Cover with Pilot Interface (X1 Function)

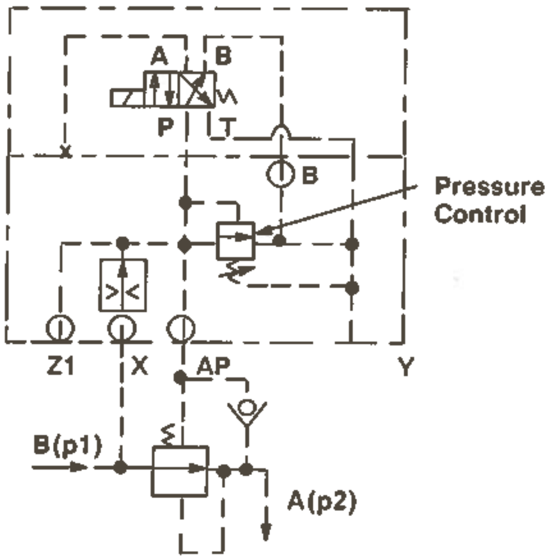


Figure 15a. Pressure Reducing Operation with Pilot Valve

When a CVGC pressure relief module is installed between the reducing cover and the pilot valve, the highest reduced pressure setting is controlled by the pilot valve and the lower reduced pressure setting is controlled by the CVGC module. The highest reduced pressure setting is active when the pilot valve is in the de-energized position. Provide at least 10 bar (150 psi) spread between the high and low pressure settings. Figure 15b shows the operation of a pressure reducing cartridge valve with dual pressure settings.

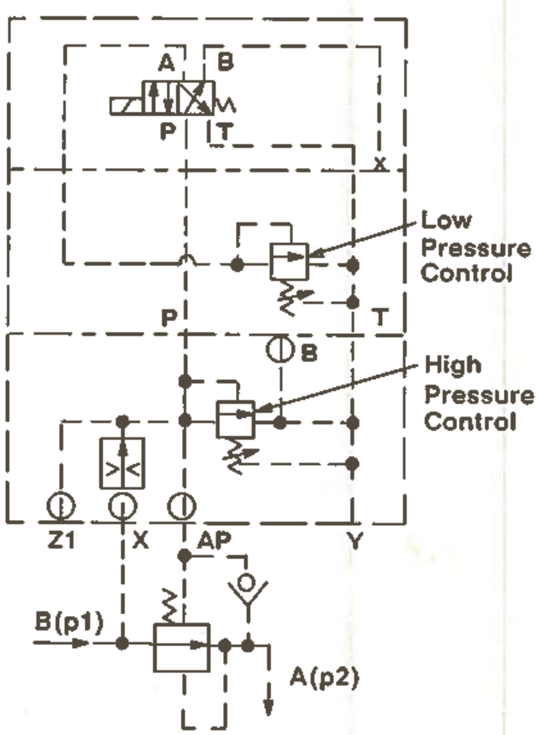


Figure 15b. Pressure Reducing Operation with Dual Pressure Settings

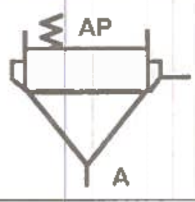
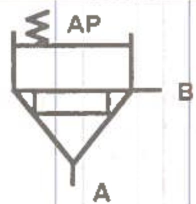
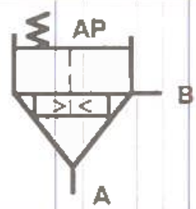
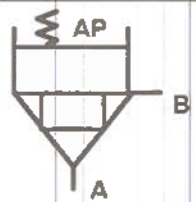
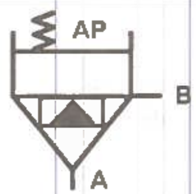
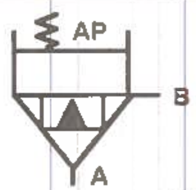
NOTE

If a CGE-02 pilot valve is used, the 'B' port must be plugged at the cover interface.

SECTION V – CARTRIDGE VALVE INSERTS

The cartridge insert functions as the working section of the cartridge valve. Flow passes through the valve when pressure from an external source exceeds the predetermined cracking pressure of the insert. The cracking pressure is determined by the poppet spring force.

The insert provides directional flow for normal applications and controlled flow or restrictive flow for sensitive applications. Seven basic types of inserts are available. The types of inserts and their respective functions and sizes are listed below.

Insert Type	Function	Functional Symbol	Size (mm)
Directional	D10		16, 25, 32, 40
Directional	D11		16, 25, 32, 40, 50, 63
Directional with Orifice	D11		16, 25, 32, 40
Directional	D20		16, 25, 32, 40, 50, 63
Restrictor	R		16, 25, 32, 40, 50, 63
Flow Control	F		16, 25, 32, 40, 50, 63
Reducing	X1		16, 25

A. Flow Ratings

The cartridge insert, unlike a spool type valve, does not have a malfunction flow (with the exception of the X1 pressure reducer insert). The poppet will open or close regardless of flow. As flow increases through the valve, a pressure drop will occur across the valve. Cartridge valves are rated by the amount of flow that passes through the valve with a 14.5 psi (1 bar) or 72.5 psi (5 bar) pressure drop. Table 5 provides flow ratings for 1:1.1 area ratios. Refer to the installation drawings (Table 8) for flow ratings on other area ratios.

Valve or Port Size	Port Size	Flow @ 14.5 psi (1 bar)		Flow @ 72.5 psi (5 bar)	
(mm)	(inch)	l/m	(gpm)	l/m	(gpm)
16	0.63	90	(24)	200	(53)
25	0.98	210	(55)	450	(119)
32	1.25	425	(112)	700	(185)
40	1.57	650	(172)	1100	(291)
50	1.97	900	(238)	1700	(449)
63	2.48	1250	(230)	2800	(740)

Table 5. Cartridge Valve Flow Ratings for 1:1.1 Area Ratios

B. Insert Kit Description

Figure 16 illustrates the standard cartridge insert kit with a 1.1:1 area ratio. The insert kit consists of a spring, poppet, sleeve, and associated seals. As illustrated in Figure 16a, the cartridge valve insert kit has three major areas; the 'A' port, the 'B' port and the 'AP' pilot port. The 'A' port area is circular and is defined by the poppet to sleeve sealing diameter. The 'B' port area is defined as the difference between the 'AP' area and the 'A' area. The 'AP' area is the circular area defined as the diameter at the top portion of the poppet. Pressure at the 'AP' area plus the spring force holds the poppet down. Pressure at the 'A' or 'B' area lifts the poppet off its seat and allows flow through the valve.

NOTE
Unlike all other cartridge inserts, the reducer insert contains a spool rather than a poppet. Therefore, no reference is made to an area ratio. The spool also incorporates an internal check valve which relieves pressure peaks at the load pressure.

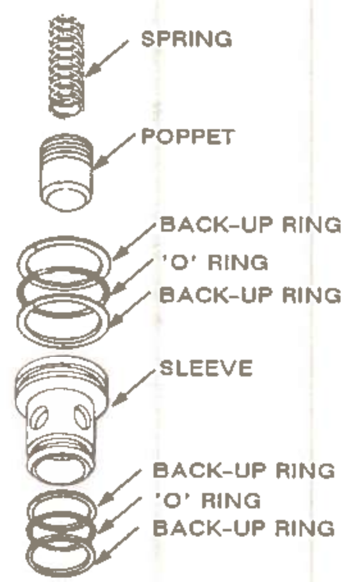


Figure 16. Cartridge Insert Kit

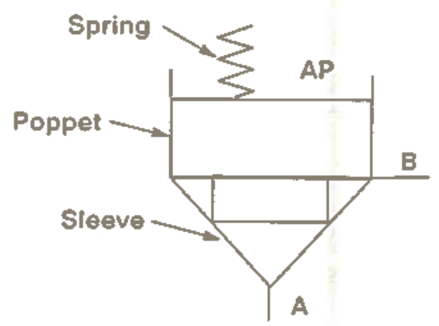


Figure 16a. Cartridge Insert Kit Operation

C. Insert Kit Identification

Four steps must be taken to determine the type of cartridge insert kit. These steps are:

1. Determine the metric size of the insert kit by measuring across the larger diameter of the sleeve. Refer to Table 6 below to establish the size. Note that the insert kit size is the same as the cover size.

Sleeve Size mm	Sleeve Size inch
16	1.260
25	1.771
32	2.362
40	2.952
50	3.543
63	4.724

Table 6. Sleeve Diameter

2. Determine the area ratio of the poppet. The poppet area ratio is determined by comparing (AP) area at the top of the poppet with the (A) area at the bottom of the poppet. For example, if the area at the top of the poppet is twice the area of the bottom portion of the poppet, the area ratio is 1:2. Three types of area ratios are available; 1:1, 1:1.1 and 1:2. Poppet area ratios are shown in figure 17.

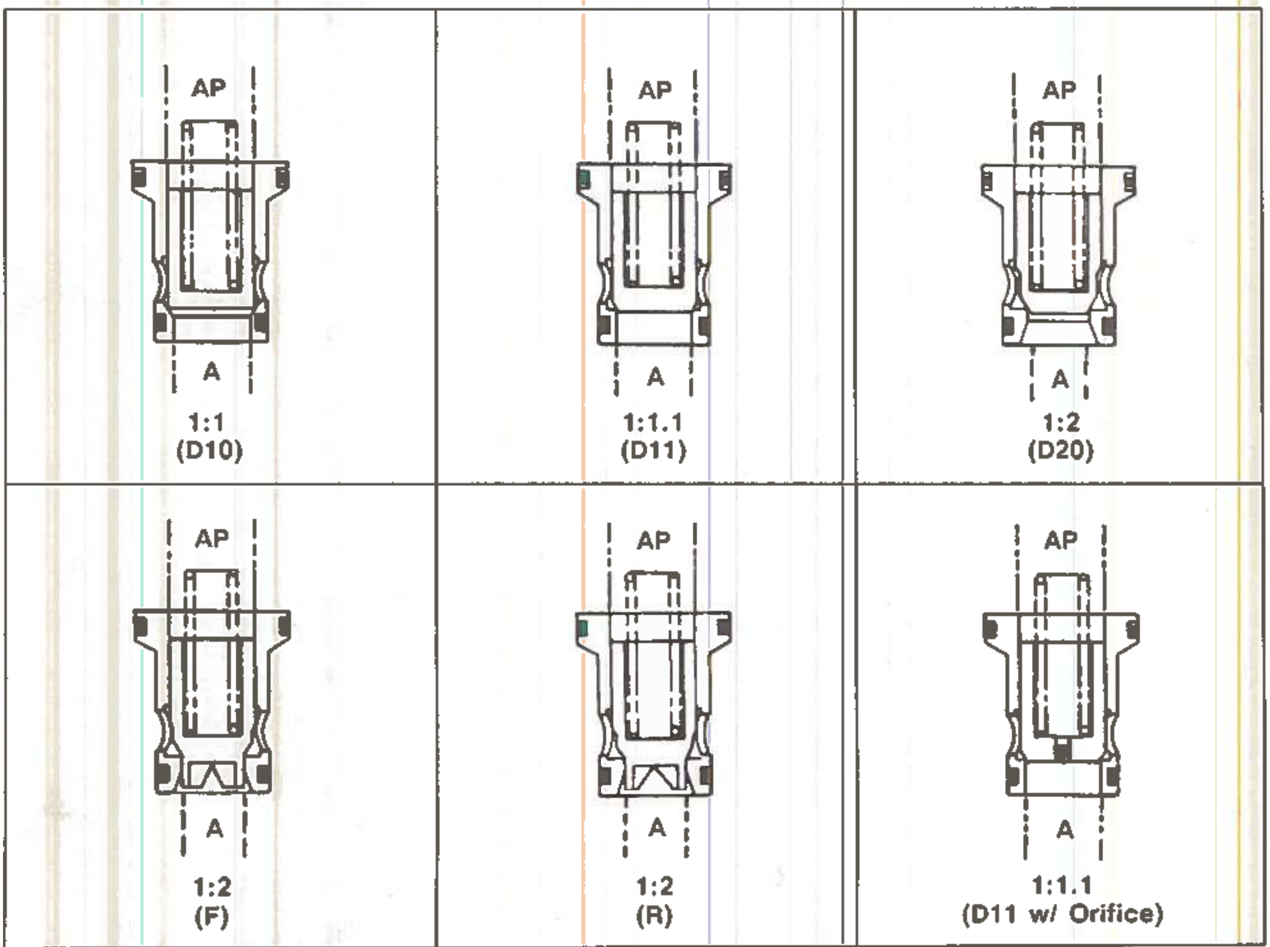


Figure 17. Poppet Area Ratios

3. Measure the insert spring wire diameter with a micrometer. This measurement will determine the cracking pressure of the spring.

NOTE

The spring may be color dyed for easier identification purposes. The spring color is cross referenced to a letter code that identifies spring cracking pressure. If the spring does not have a color, determine the spring cracking pressure by the wire diameter. Refer to Table 7 for the spring wire diameter and color code.

Valve Size	Insert Spring	Wire Diameter Inch	Color Code	Letter Code
16mm	761564	0.039	White	L
	761565	0.055	Blue	M
	761566	0.063	Red	H
25mm	761567	0.059	White	L
	761568	0.079	Blue	M
	761569	0.098	Red	H
32mm	815220	0.079	White	L
	815221	0.104	Blue	M
	815222	0.128	Red	H
40mm	761570	0.098	White	L
	761571	0.118	Blue	M
	761572	0.150	Red	H
50mm	763674	0.138	White	L
	763675	0.181	Blue	M
	763676	0.217	Red	H
63mm	763712	0.171	White	L
	763713	0.232	Blue	M
	763714	0.276	Red	H

Note: L = Low Cracking pressure
M = Medium Cracking Pressure
H = High Cracking Pressure

(Refer to Table 12 for additional spring information)

Table 7. Insert Spring Dimensions

4. Determine the type of insert kit and its related function from Table 11. The insert function may be determined by the number/letter code that is stamped on the insert sleeve. See Figure 2a.

Section VI – SYSTEM INSPECTION & MAINTENANCE

A. Installation Drawings

The installation drawings listed in Table 8 show installation dimensions and port locations for cartridge valves.

Cartridge Valve Type	Installation Drawing No.
Directional & Check	519200
Pressure Relief	519210
Pressure Reducing	519205

Table 8. Installation Drawings

B. Mounting

In general, cartridge valve mounting is unrestricted. It is recommended that the cartridge valve be mounted on a horizontal axis when a detented pilot valve is attached to the cartridge cover assembly. Cartridge valves are designed to be installed into a manifold block. This minimizes external circuit connections and provides a very compact package. Each cartridge valve installation is unique for a specific application. Many valve functions can be obtained within the manifold block.

C. Piping and Tubing

If a cartridge valve manifold block is actuator mounted, only pressure and tank lines are required. All pipes, tubing, and manifold passages must be thoroughly cleaned. Recommended methods of cleaning are sandblasting, wire brushing, pickling and power flushing.

Maintain only the amount of connections and fittings that are necessary for proper installation. This will minimize flow resistance and the possibility of leakage.

The number of bends in the tubing should be kept to a minimum to prevent excessive turbulence and friction of oil flow. Tubing must not be bent too sharply. The recommended minimum radius for tube bending is three times the inside diameter of the tube.

D. Hydraulic Fluid Recommendations

Hydraulic fluid performs the dual function of lubrication and transmission of power. Hydraulic fluid constitutes a vital factor in a hydraulic system. Careful selection of the fluid should be made with the assistance of a reputable supplier. Proper fluid selection provides satisfactory life and operation of system components. Fluid selected for valves must also be acceptable for the system pumping source and actuator. Refer to data sheet I–286–S for selection of hydraulic fluids.

E. Adding Fluid to the System

When hydraulic fluid is added to replenish the system, it should always be poured through a fine wire screen (200 mesh or finer) or preferably pumped through a 10 micron absolute filter. It is important that the fluid be kept clean and free from any substance that could cause improper operation or wear of the hydraulic unit. Therefore, the use of cloth to strain the fluid should be avoided.

F. System Cleanliness

Thorough precautions should be observed to insure the hydraulic system is clean at all times. Perform the following steps:

1. Clean (flush) any new system to remove paint, metal chips, welding shot, etc.
2. Filter each change of fluid to prevent the introduction of contaminants.
3. Provide continuous fluid filtration to remove sludge, products of wear, and corrosion that has generated during the life of the system. Maintain an ISO cleanliness code of 18/13 or cleaner. System cleanliness may be obtained through the use of OFP, OFR or OFRS series filters.
4. Seal the system to prevent the introduction of airborne contaminants.

G. Sound Level

Noise is only indirectly affected by fluid selection. However, the condition of the fluid is very important for obtaining optimum reductions of system sound levels. Some of the major factors that cause noise in a hydraulic system are:

1. Very high fluid viscosity at start–up temperatures
2. Running the system with moderately high fluid viscosity
3. Improper circuit or reservoir design

H. Adjustments

The only cartridge valves that have an adjustment are the units with the stroke adjustment feature. Stroke adjusters limit the insert poppet travel and act as a flow regulator in the circuit. In general, adjusting the orifice sizes in the valve cover will not be required since the system is tuned during the design phase.

I. Product Life

The service life of this product is dependent upon environment, duty cycle, operating parameters, and system cleanliness. Since these parameters vary from application to application, the ultimate user must determine and establish the periodic maintenance requirements to maximize life and detect potential component failure.

J. Replacement Parts

Reliable operation throughout the specified operating range is assured only if genuine parts are used. Sophisticated design processes and materials are used in the manufacture of these parts. Substitutions may result in early failure.

SECTION VII – OVERHAUL & PARTS INFORMATION

WARNING

Before breaking a circuit connection, make sure that power is off and system pressure is released. Lower all vertical cylinders, discharge accumulators, and block any load that could generate pressure.

CAUTION

Absolute cleanliness is essential when working on a hydraulic system. Always work in a clean area. The presence of dirt and foreign materials in the system can result in serious damage or inadequate operation.

NOTE

Discard and replace all o–rings, gaskets, and back–up rings removed during disassembly.

A. Service Tools

The following service tools are required to overhaul a cartridge valve.

1. A torque wrench with hex bit adapters. Refer to Table 9 for appropriate torque wrench values.

Cover Size	Mounting Screw	
	N.m	lb.ft.
16mm	35	26
25mm	110	80
32mm	285	210
40mm	500	370
50mm	580	430
63mm	1200	890

Table 9. Torque Requirements

2. A set of U.S.A. and metric hex key wrenches
3. A set of small pin punches
4. A 3/8 inch ratchet with sockets
5. A small ball peen hammer
6. A 1 inch micrometer
7. A suitable piece of hardwood or nylon block to install sleeve
8. A suitable extractor tool to remove insert poppet and sleeve

B. Cartridge Cover Disassembly & Assembly

Perform the following steps:

1. Locate the appropriate cover assembly figure number from the following listing (page 22 & 23). Refer to exploded view drawings 18 through 27 when ordering replacement parts.
2. If required, remove the pilot valve from top of cover assembly.
3. Remove the cover from the manifold block.
4. Disassemble the cover according to item number sequence order.
5. Inspect the cover parts for damage or excessive wear. Make sure all orifices are open and free from dirt. If a new orifice plug is required, refer to Table 10 and obtain an orifice kit. Orifices have been redesigned from a screwdriver slot to hex head.

Color/	Size	Valve Size (mm)		
		16	25/32/40	50/63
Red	0.5	635132	635149	
White	0.6	635133	635150	
Green	0.7	* 635134	* 635151	
Blue	0.8	635135	635152	* 635173
Purple	0.9		* 635153	
Yellow	1.0	* 635136	* 635154	* 635174
Pink	1.1	635137	635155	
Orange	1.2	* 635138	* 635156	* 635175
Violet	1.3	635139	* 635157	
Brown	1.4	635140	* 635158	
Grey	1.5	* 635141	* 635159	635176
	1.6			* 635177
	1.7		635160	
	1.8			* 635178
	2.0			635179
	2.3	635142		
	2.5		635161	
	3.0			635180
	5.4			675958
Solid Plug		* 35633	* 812	* 675169
† Orifice Kit		926281	926282	926283

*** Included in Orifice Kit (quan. 3 per kit)**
NOTE: Orifices available only in kits. Kits contain 3 of each size. Threads are inch and orifice diameter is millimeter.

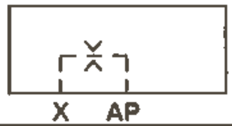
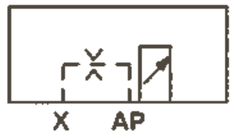
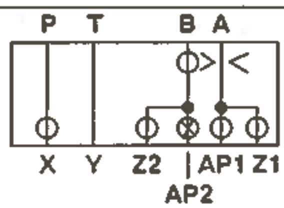
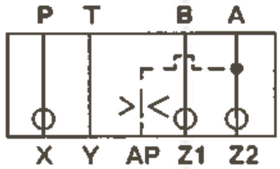
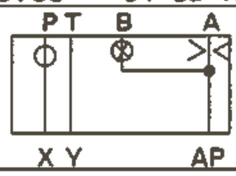
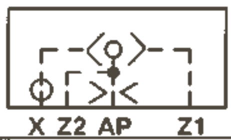
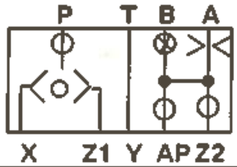
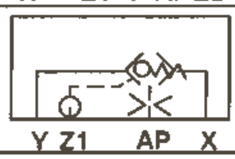
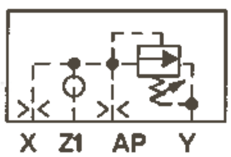
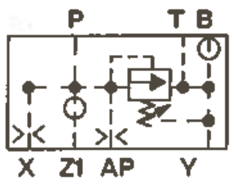
Table 10. Orifice Kits

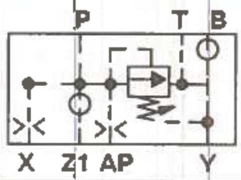
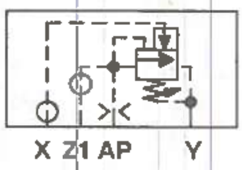
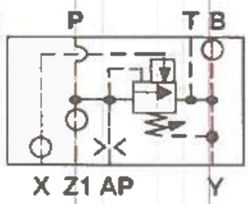
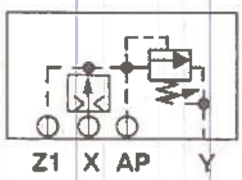
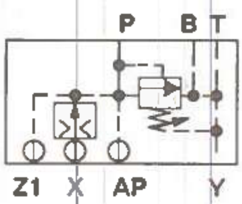
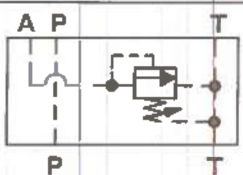
NOTE

If a complete cover assembly is required, obtain a new cover assembly by the model code that is stamped on the cover nameplate.

NOTE

Cover assemblies that have an NFPA–D03 interface were formally designated as NFPA–D01. Cover assemblies that have an NFPA–D05 interface were formally designated as NFPA–D02 .

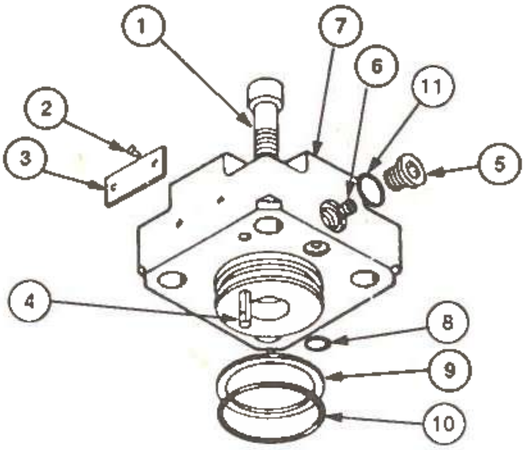
Parts Figure No.	Cover Type	Functional Symbol	Cover Assembly Model Code
18	Directional		CVCS-**-N-S2-10
19	Directional with Locknut Adj.		CVCS-**-A-S2-W-10
	Directional with Micrometer Adj.		CVCS-**-A-S2-M-10
	Directional with Micrometer/key Adj.		CVCS-**-A-S2-10
20	Directional with NFPA-D03 Interface	 CVCS-**-D1-S2-10	 CVCS-**-D2-S2-10
	Directional with NFPA-D05 Interface		
21	Directional with NFPA-D03 Interface & Locknut Adj. (NO-Normally Open Function Shown)		CVCS-**-AD1-S2-W-10-NC
			CVCS-**-AD1-S2-W-10-NO
22	Shuttle		CVCS-**-W-S2-10
23	Shuttle with NFPA-D03 Interface (W11 Function Shown)		CVCS-**-W11-S2-10
23a	Shuttle with NFPA-D03 Interface (W31)		CVCS-**-W31-S2-10
24	Pilot Operated Check		CVCS-**-PC-S2-10
25	Pressure Relief with Locknut Adj.		CVCS-**-C-S2-W-***-10
	Pressure Relief with Micrometer Adj.		CVCS-**-C-S2-M-***-10
	Pressure Relief with Micrometer/Key		CVCS-**-C-S2-K-***-10
25	Pressure Relief with NFPA-D03 Interface & Locknut Adj.		CVCS-**-C1-S2-W-***-10
	Pressure Relief with NFPA-D03 Interface & Micrometer Adj.		CVCS-**-C1-S2-M-***-10

No.	Description	Symbol	Model Code
25	Pressure Relief with NFPA-D03 Interface & Micrometer/key Adj.		CVCS-**-C1-S2-K-***-10
26	Unloading with Locknut Adj.		CVCS-**-U-S2-W-***-10
	Unloading with Micrometer Adj.		CVCS-**-U-S2-M-***-10
	Unloading with Micrometer/key Adj.		CVCS-**-U-S2-K-***-10
26	Unloading with NFPA-D03 Interface & Locknut Adj.		CVCS-**-U1-S2-W-***-10
	Unloading with NFPA-D03 Interface & Micrometer Adj.		CVCS-**-U1-S2-M-***-10
	Unloading with NFPA-D03 Interface & Micrometer/key Adj.		CVCS-**-U1-S2-K-***-10
27	Pressure Reducing with Locknut Adj.		CVCS-**-X-S2-W-***-10
	Pressure Reducing with Micrometer Adj.		CVCS-**-X-S2-M-***-10
	Pressure Reducing with Micrometer/key Adj.		CVCS-**-X-S2-K-***-10
27	Pressure Reducing with NFPA-D03 Interface & Locknut Adj.		CVCS-**-X1-S2-W-***-10
	Pressure Reducing with NFPA-D03 Interface & Micrometer Adj.		CVCS-**-X1-S2-M-***-10
	Pressure Reducing with NFPA-D03 Interface & Micrometer/key Adj.		CVCS-**-X1-S2-K-***-10
28	Pressure Relief Module		CVGC-3-*-***-10

>< - Standard orifice location

○ - Tapped port for installation of an additional orifice

CVCS-**-N-S2-10



NOTE
Bolt kit not included in cover assembly.

Figure 18. Directional Cover Assembly (N Function)

Item No.	Part Description	Size (mm)					
		16	25	32	40	50	63
1	Bolt Kit – inch	590700	590704	590713	590706	590708	590710
	– mm	590701	590705	590718	590707	590709	590711
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)	(430)	(890)
2	Screw (2 Req'd)	36212	36212	36212	36212	36212	36212
3	Nameplate	199082	199082	199082	199082	199082	199082
4	Roll Pin	168319	226797	226797	226797	195940	195940
5	Plug	398071	398071	398071	398071	315932	315932
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)	(22)	(22)
* 6	Orifice Plug (Std.)	635136	635156	635157	635158	635177	635178
■ 7	Cover	580013	580056	730408	580094	589106	589129
▲ 8	O-Ring	262330	262331	262332	262334	262334	262354
▲ 9	Back-up Ring	277652	277707	277712	277716	277781	277790
▲ 10	O-Ring	262360	262401	262406	262410	262467	262476
▲ 11	O-Ring	263492	263492	263492	263492	263496	263496

Note: 1 lb. ft. = .74 Nm.

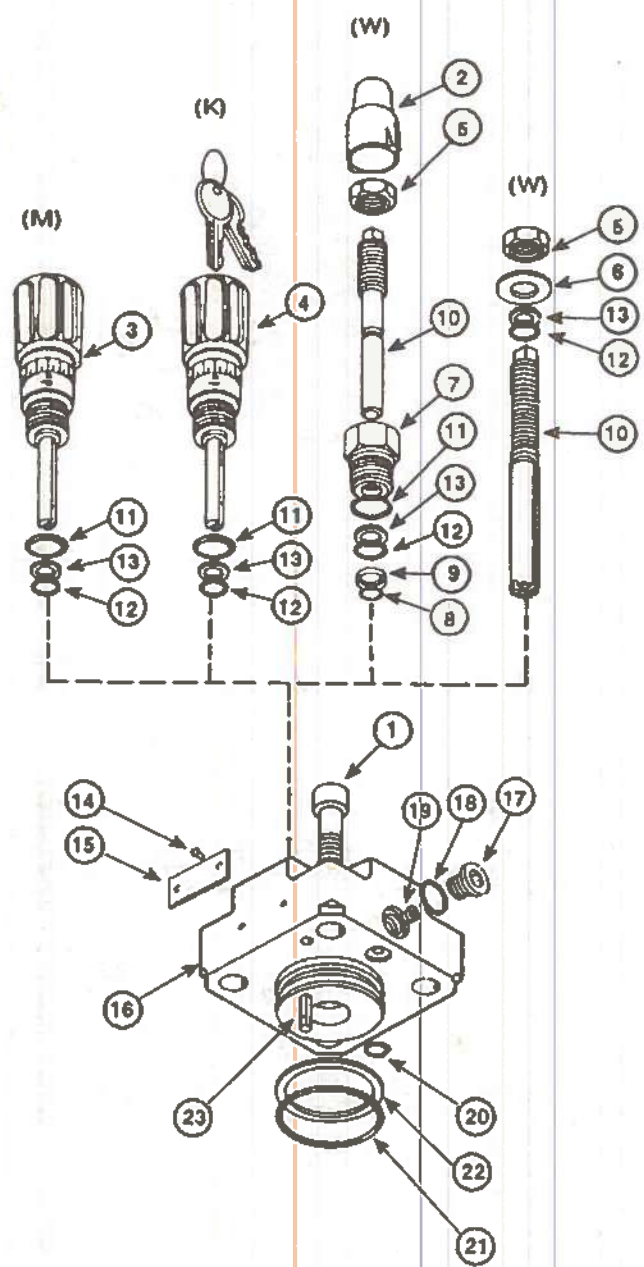
▲ – Included in seal kit (Table 13)

■ – Not available for sale

* – Refer to Table 10 for other orifice sizes

Figure 18. Parts Tabulation

CVCS-**-A-S2-*-10



NOTE

Bolt kit not included in cover assembly.

Figure 19. Directional Cover Assembly with Stroke Adjuster (A Function)

Item No.	Part Description	Valve Size (mm)					
		16	25	32	40	50	63
1	Bolt Kit - inch	590700	590704	590713	590706	590708	590710
	- mm	590701	590705	590718	590707	590709	590711
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)	(430)	(890)
◆ 2	Cap	762607	762607	—	—	—	—
3	Micrometer S/A (M)	637458	637460	—	—	—	—
4	Micrometer/key S/A (K)	637459	637461	—	—	—	—
◆ 5	Lock Nut	761190	761190	688469	761190	763770	763727
6	Washer	—	—	688471	763690	763726	688471
◆ 7	Adaptor	579922	579922	—	—	—	—
	Torque to (lb. ft.)	(81)	(81)	—	—	—	—
8	Circlip	762487	762487	—	—	—	—
9	Retaining Ring	762488	762488	—	—	—	—
◆ 10	Adjuster Rod	764458	764459	730407	579926	589151	589152
▲ 11	O-Ring	262355	262355	—	—	—	—
▲ 12	O-Ring	262350	262350	262349	262350	262390	262392
▲ 13	Back-up Ring	197588	197588	197587	197588	197628	197630
14	Screw (2 Req'd)	36212	36212	36212	36212	36212	36212
15	Nameplate	199082	199082	199082	199082	199082	199082
■ 16	Cover	580014	580057	730409	580095	589108	589131
17	Plug	398071	398071	398071	398071	315932	315932
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)	(22)	(22)
▲ 18	O-Ring	263492	263492	263492	263492	263496	263496
* 19	Orifice (Std.)	635136	635156	635157	635158	635177	635178
▲ 20	O-Ring	262330	262331	262332	262334	262334	262354
▲ 21	O-Ring	262360	262401	262406	262410	262467	262476
▲ 22	Back-up Ring	277652	277707	277712	277716	277781	277790
23	Roll Pin	168319	226797	226797	226797	195940	195940

Note: 1 lb. ft. = 1.36 Nm.

▲ - Included in seal kit (Table 13)

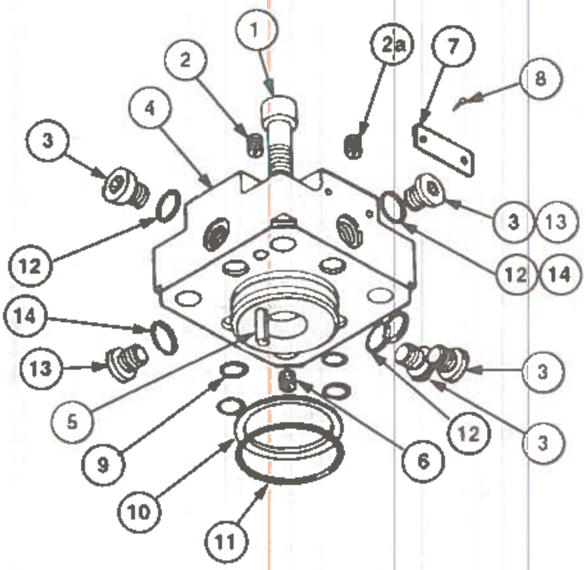
◆ - Included in adjuster rod kit 941472 (16, 25mm only)

* - Refer to Table 10 for other orifice sizes

■ - Not available for sale

Figure 19. Parts Tabulation

CVCS-**-D1-S2-10
CVCS-**-D2-S2-10



NOTE
Bolt kit not included in cover assembly.

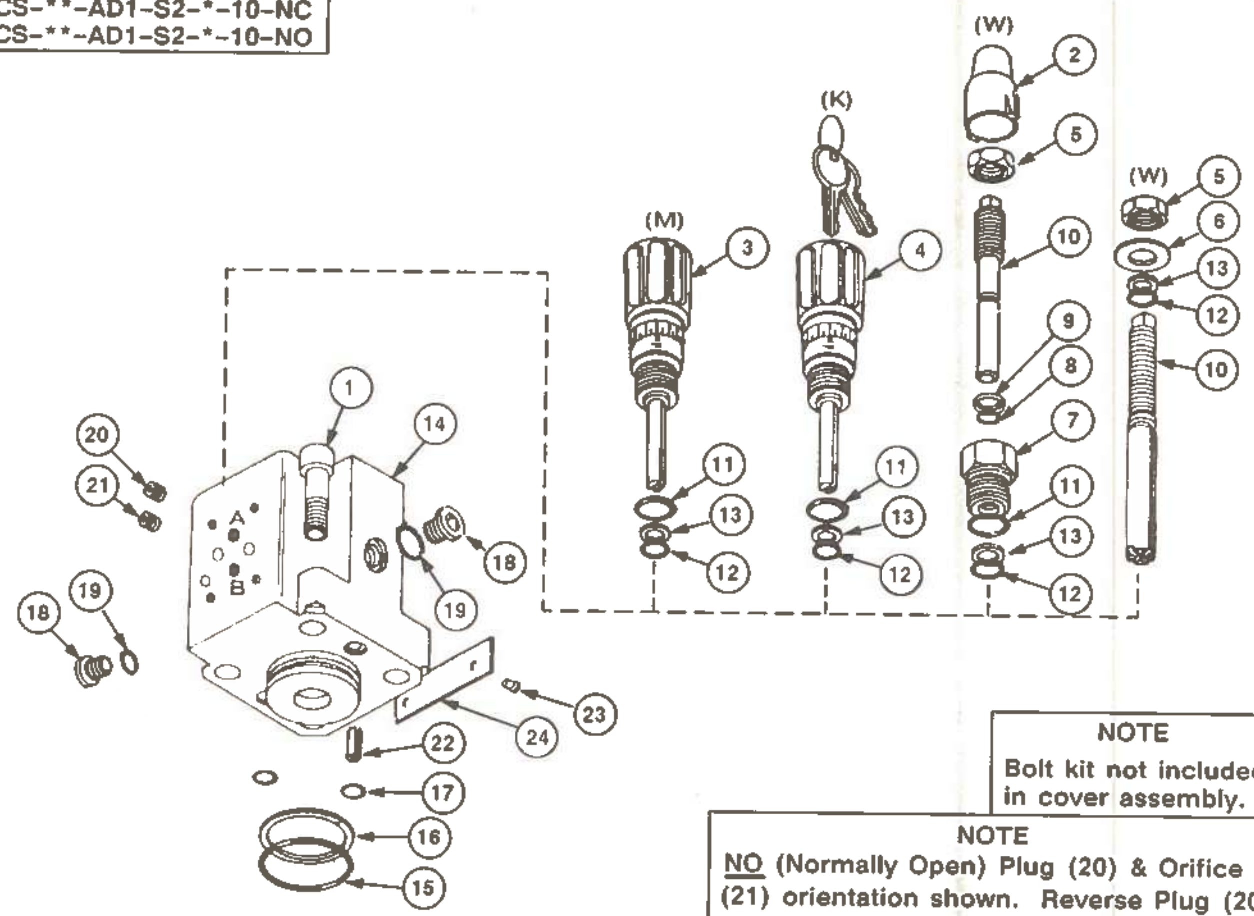
Figure 20. Directional Cover Assembly with NFPA-D03 / NFPA-D05 Interface (D1 & D2 Function)

Item No.	Part Description	Valve Size (mm)					
		16	25	32	40	50	63
1	Bolt Kit – inch	590700	590704	590713	590706	590708	590710
	– mm	590701	590705	590718	590707	590709	590711
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)	(430)	(890)
* 2	Orifice (Std.)	635136	635156	635157	635158	——	——
2a	Plug	——	812	812	812	——	——
3	Plug (Qty.)	398071 (4)	398071 (4)	398071 (4)	398071 (4)	315932 (3)	315932 (3)
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)	(22)	(22)
■ 4	Cover (NFPA-D03)	517257	731025	476658	477364	——	——
	Cover (NFPA-D05)	——	——	——	——	589107	589130
5	Roll Pin	168319	226797	226797	226797	195940	195940
* 6	Orifice (Std.)	——	——	——	——	635177	635178
7	Nameplate	199082	199082	199082	199082	199082	199082
8	Screw (2 Req'd)	AX-36212	AX-36212	AX-36212	AX-36212	AX-36212	AX-36212
▲ 9	O-Ring (4 Req'd)	262330	262331	262332	262334	262334	262354
▲ 10	Back-up Ring	277652	277707	277712	277716	277781	277790
▲ 11	O-Ring	262360	262401	262406	262410	262467	262476
▲ 12	O-Ring	263492	263492	263492	263492	263496	263496
13	Plug (2 Req'd)	——	——	——	——	343740	343740
	Torque to (lb. ft.)	——	——	——	——	(11)	(11)
▲ 14	O-Ring	——	——	——	——	263494	263494

Note: 1 lb. ft. = .1.36 Nm.
▲ – Included in seal kit (Table 13)
■ – Not available for sale
* – Refer to Table 10 for other orifice sizes

Figure 20. Parts Tabulation

CVCS-**-AD1-S2-*-10-NC
CVCS-**-AD1-S2-*-10-NO



NOTE
Bolt kit not included in cover assembly.

NOTE
NO (Normally Open) Plug (20) & Orifice (21) orientation shown. Reverse Plug (20) & Orifice (21) for NC (Normally Closed) operation.

Figure 21. Directional Cover Assembly with NFPA-D03 Interface and Stroke Adjuster (AD1 Function)

Item No.	Part Description	Valve Size (mm)	
		25	40
1	Bolt Kit – inch	590704	590706
	– mm	590705	590707
	Torque to (lb. ft.)	(81)	(370)
2	Cap	762607	———
3	Micrometer S/A (M)	730236	———
4	Micrometer/key S/A (K)	730235	———
5	Lock Nut	761190	761190
6	Washer	———	761192
7	Adaptor	579922	———
8	Circlip	762487	———
9	Retaining Ring	762488	———
10	Adjuster Rod	730128	730129
▲ 11	O-Ring	262355	———
▲ 12	O-Ring	262350	262350
▲ 13	Back-up Ring	197588	197588

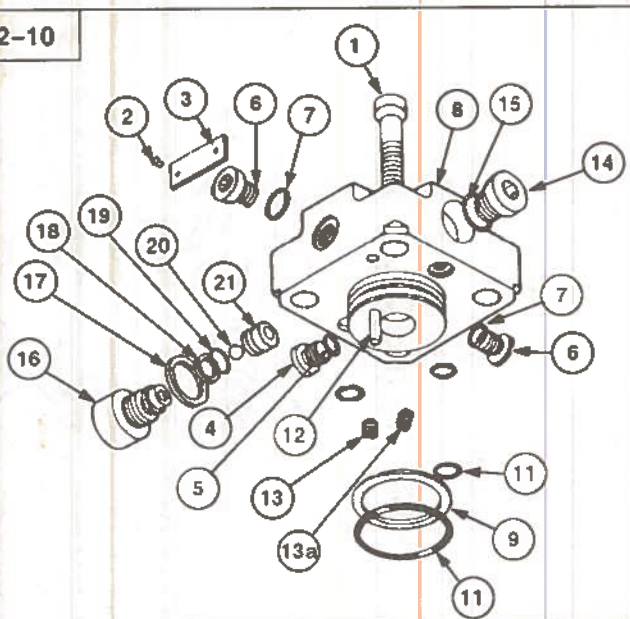
Item No.	Part Description	Valve Size (mm)	
		25	40
■ 14	Cover	684793	684798
▲ 15	O-Ring	262401	262410
▲ 16	Back-up Ring	277707	277716
▲ 17	O-Ring (2 Req'd)	262331	262334
18	Plug (2 Req'd)	———	398071
	Torque to (lb. ft.)	———	(7.4)
▲ 19	O-Ring (2 Req'd)	———	263492
20	Plug (NO) @ A Port	812	812
* 21	Orifice (NO) @ B Port	635156	635158
20	Plug (NC) @ B Port	812	812
* 21	Orifice (NC) @ A Port	635156	635158
22	Roll Pin	226797	226797
23	Screw (2 Req'd)	36212	36212
24	Nameplate	199082	199082

Note: 1 lb ft. = 1.36 Nm.
▲ – Included in seal kit (Table 13)

■ – Not available for sale
* – Refer to Table 10 for other orifice sizes

Figure 21. Parts Tabulation

CVCS-**-W-S2-10



Item No.	Part Description	Part No.
16	Plug	760881
	Torque (lb. ft.)	(75)
▲ 17	USIT Ring	763633
▲ 18	Back-up Ring	580550
▲ 19	O-ring	262333
20	Ball	1651
21	Seat	760882

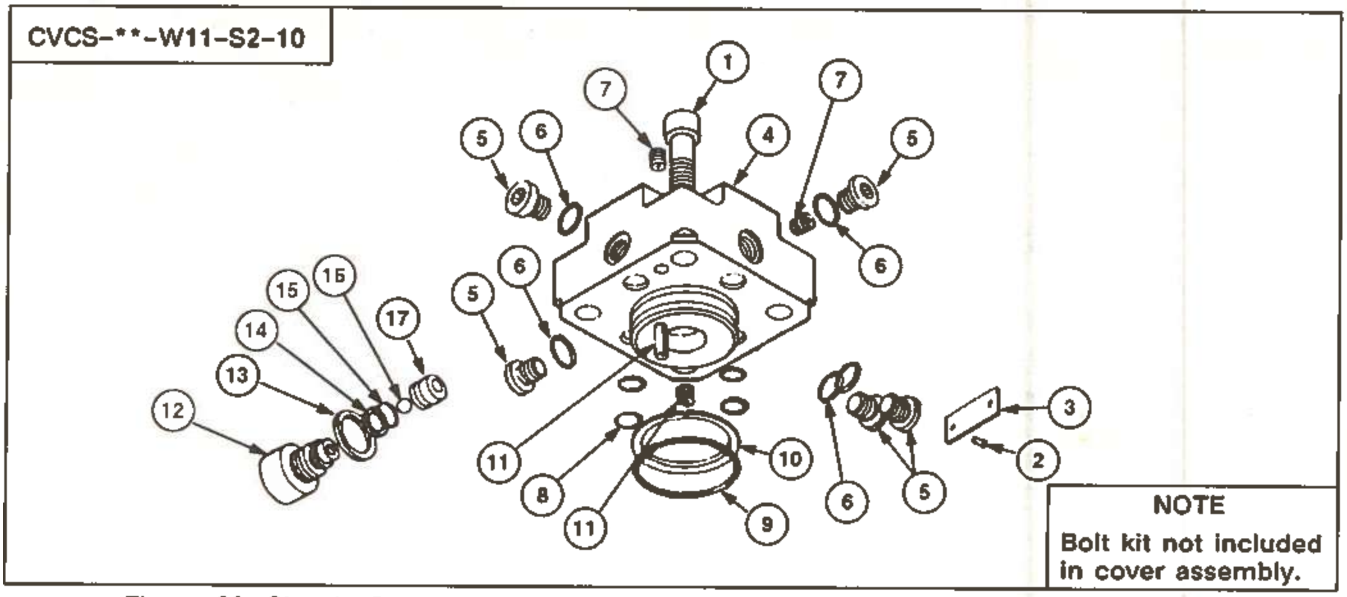
NOTE
Bolt kit not included in cover assembly.

Figure 22. Shuttle Cover Assembly (W Function)

Item No.	Part Description	Valve Size (mm)			
		16	25	32	40
1	Bolt Kit – inch	590700	590704	590713	590706
	– mm	590701	590705	590718	590707
	Torque to (lb. ft.)	(26)	(81)	(210)	(370)
2	Screw (2 Req'd)	AX-36212	AX-36212	AX-36212	AX-36212
3	Nameplate	199082	199082	199082	199082
4	Plug	—	—	398071	398071
	Torque to (lb. ft.)	—	—	(7.4)	(7.4)
▲ 5	O-Ring	—	—	263492	263492
6	Plug (2 Req'd)	398071	398071	398071	398071
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
▲ 7	O-Ring (2 Req'd)	263492	263492	263492	263492
■ 8	Cover	517259	477102	476660	477366
▲ 9	Back-up Ring	277652	277707	277712	277716
▲ 10	O-Ring	262360	262401	262406	262410
▲ 11	O-Ring (3 req'd)	262330	262331	262332	262334
12	Roll Pin	168319	226797	226797	226797
* 13	Orifice (Std.)	635136	635156	635157	635158
⊖ 13a	Solid Plug	—	—	812	812
14	Plug	—	—	315932	315932
	Torque to (lb. ft.)	—	—	(22)	(22)
▲ 15	O-Ring	—	—	263496	263496
16–21	See Fig. 22 Shuttle Cover Assy.	16, 25, 32, 40mm			

Note: 1 lb. ft. = 1.36 Nm.
▲ – Included in seal kit (Table 13)
■ – Not available for sale
* – Refer to Table 10 for other orifice sizes
⊖ – Do Not Remove

Figure 22. Parts Tabulation



NOTE
Bolt kit not included in cover assembly.

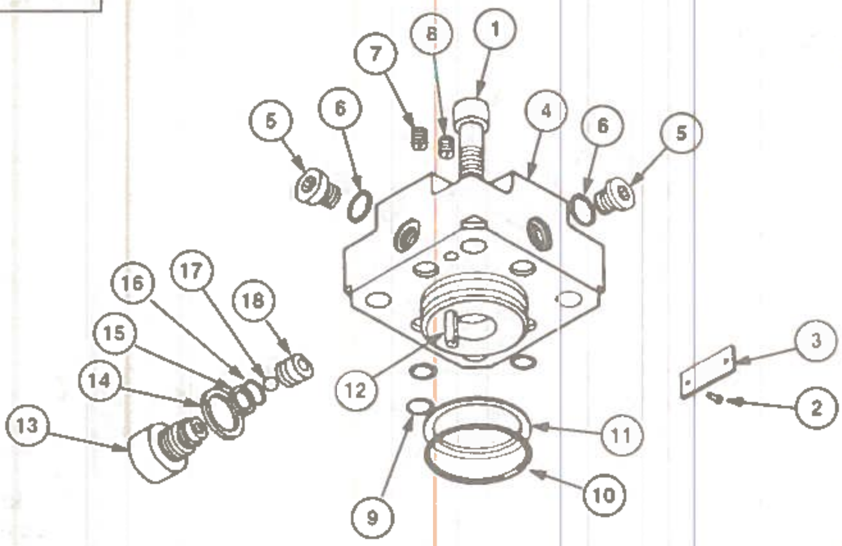
Figure 23. Shuttle Cover Assembly with NFPA-D03 Interface (W11 Function)

	Item No.	Part Description	Valve Size (mm)			
			16	25	32	40
	1	Bolt Kit - inch	590700	590704	590713	590706
		- mm	590701	590705	590718	590707
		Torque to (lb. ft.)	(26)	(81)	(210)	(370)
	2	Screw (2 Req'd)	AX-36212	AX-36212	AX-36212	AX-36212
	3	Nameplate	199082	199082	199082	199082
■	4	Cover	517260	477103	476656	477367
	5	Plug (Qty.)	398071 (4)	398071 (4)	398071 (5)	398071 (5)
		Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
▲	6	O-Ring (Qty.)	263492 (4)	263492 (4)	263492 (5)	263492 (5)
*	7	Orifice (Std.)	635136	635156	635157	635158
▲	8	O-Ring (4 Req'd)	262330	262331	262332	262334
▲	9	O-Ring	262360	262401	262406	262410
▲	10	Back-up Ring	277652	277707	277712	277716
	11	Roll Pin	168319	226797	226797	226797
	12	Plug	760881	760881	760881	760881
		Torque to (lb. ft.)	(75)	(75)	(75)	(75)
▲	13	USIT Ring	763633	763633	763633	763633
▲	14	Back-up Ring	580550	580550	580550	580550
▲	15	O-Ring	262333	262333	262333	262333
	16	Ball	1651	1651	1651	1651
	17	Seat	760882	760882	760882	760882

Note: 1 lb. ft. = 1.36 Nm.
▲ - Included in seal kit (Table 13)
■ - Not available for sale
* - Refer to Table 10 for other orifice sizes.
⊖ - Do Not Remove

Figure 23. Parts Tabulation

CVCS-**-W31-S2-10



NOTE
Bolt kit not included in cover assembly.

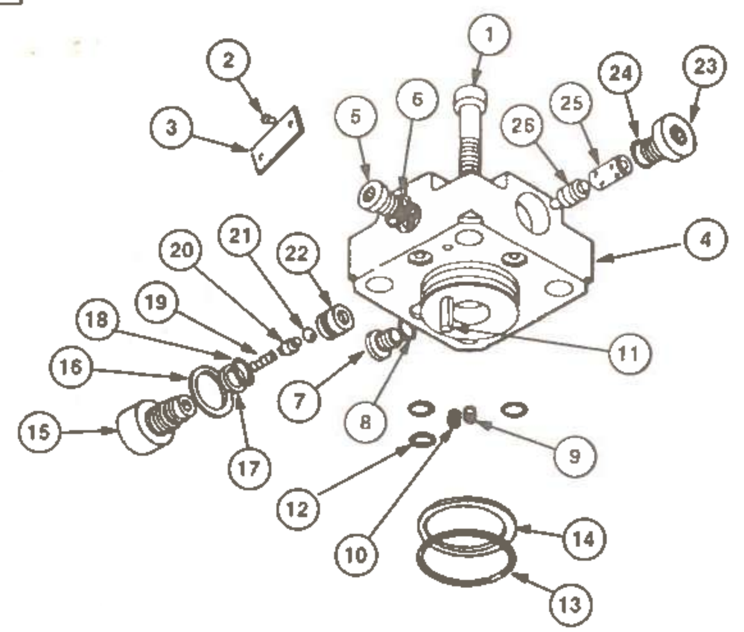
Figure 23a. Shuttle Cover Assembly with NFPA-D03 Interface (W31 Function)

Item No.	Part Description	Valve Size (mm)			
		16	25	32	40
1	Bolt Kit – inch	590700	590704	590713	590706
	– mm	590701	590705	590718	590707
	Torque to (lb. ft.)	(26)	(81)	(210)	(370)
2	Screw (2 Req'd)	36212	36212	36212	36212
3	Nameplate	199082	199082	199082	199082
■ 4	Cover	517261	477104	476657	477368
5	Plug (Qty.)	398071(1)	398071(2)	398071(2)	398071(2)
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
▲ 6	O-Ring (Qty.)	263492(1)	263492(2)	263492(2)	263492(2)
7	Plug (@ 'B')	35633	812	812	812
* 8	Orifice (Std.) (@ 'A')	635136	635156	635157	635158
▲ 9	O-Ring (3 Req'd)	262330	262331	262332	262334
▲ 10	O-Ring	262360	262401	262406	262410
▲ 11	Back-up Ring	277652	277707	277712	277716
12	Roll Pin	168319	226797	226797	226797
13	Plug	760881	760881	760881	760881
	Torque to (lb. ft.)	(75)	(75)	(75)	(75)
▲ 14	USIT Ring	763633	763633	763633	763633
▲ 15	Back-up Ring	580550	580550	580550	580550
▲ 16	O-Ring	262333	262333	262333	262333
17	Ball	1651	1651	1651	1651
18	Seat	760882	760882	760882	760882

Note: 1 lb. ft. = 1.36 Nm.
▲ – Included in seal kit (Table 13)
■ – Not available for sale
* – Refer to Table 10 for other orifice sizes.

Figure 23a. Parts Tabulation

CVCS-**-PC-S2-10



NOTE
Bolt kit not included in cover assembly.

Figure 24. Pilot Operated Check Cover Assembly (PC Function)

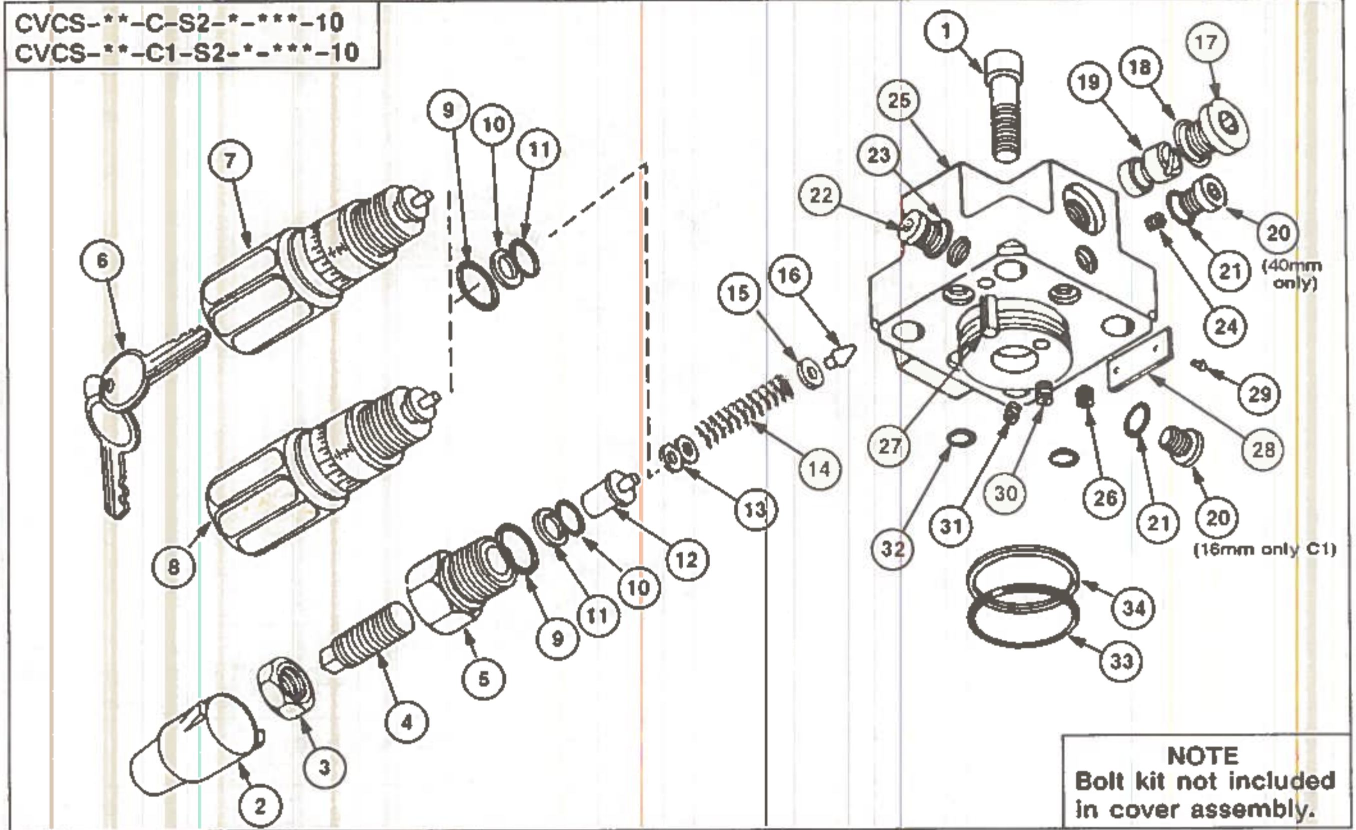
Item No.	Part Description	Valve Size (mm) 16	25	32	40
1	Bolt Kit – inch	590700	590704	590713	590706
	– mm	590701	590705	590718	590707
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)
2	Screw (2 Req'd)	36212	36212	36212	36212
3	Nameplate	199082	199082	199082	199082
■ 4	Cover	517258	477101	476659	477365
5	Plug	398071	398071	398071	398071
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
▲ 6	O-Ring	263492	263492	263492	263492
7	Plug	——	——	398071	398071
	Torque to (lb. ft.)	——	——	(7.4)	(7.4)
▲ 8	O-Ring	——	——	263492	263492
* 9	Orifice (Std.)	635136	635156	635157	635158
⊖ 10	Plug	——	——	812	812
11	Roll Pin	168319	226797	226797	226797
▲ 12	O-Ring (3 Req'd)	262330	262331	262332	262334
▲ 13	O-Ring	262360	262401	262406	262410
▲ 14	Back-up Ring	277652	277707	277712	277716

Item No.	Part Description	Size(mm) 16-40
15	Plug	760881
	Torque (lb. ft.)	(75)
▲ 16	USIT Ring	763633
▲ 17	Back-up Ring	580550
▲ 18	O-Ring	262333
19	Spring	544103
20	Spool	760889
21	Ball	1651
22	Seat	760882
23	Plug	315932
	Torque (lb. ft.)	(22)
▲ 24	O-Ring	263496
25	Spacer (16mm)	Omit
	Spacer (25mm)	Omit
	Spacer (32mm)	730435
	Spacer (40mm)	761506
26	Pilot Spool (16mm)	867947

Note: 1 lb. ft. = 1.36 Nm.
▲ – Included in seal kit (Table 13)
■ – Not available for sale
* – Refer to Table 10 for other orifice sizes
⊖ – Do not remove.

Figure 24. Parts Tabulation

CVCS-**-C-S2-*-***-10
CVCS-**-C1-S2-*-***-10



NOTE
Bolt kit not included in cover assembly.

Figure 25. Pressure Relief Cover Assembly (C & C1 Function)

Item No.		Part Description	Valve Size (mm)			
			16	25	32	40
	1	Bolt Kit - inch	590702	590704	590713	590706
		- mm	590703	590705	590718	590707
		Torque to (lb. ft.)	(26)	(80)	(210)	(370)
◆	2	Cap	762607	762607	762607	762607
◆	3	Lock Nut	761190	761190	761190	761190
◆	4	Adjusting Rod	762918	762918	762918	762918
◆	5	Adaptor	579922	579922	579922	579922
		Torque to (lb. ft.)	(75)	(75)	(75)	(75)
	6	Keys (1 set of 2)	814573	814573	814573	814573
	7	Micrometer/key S/A (K)	637463	637463	637463	637463
	8	Micrometer S/A (M)	637462	637462	637462	637462
▲	9	O-Ring	262335	262335	262335	262335
▲	10	O-Ring	262350	262350	262350	262350
▲	11	Back-up Ring	197588	197588	197588	197588
◆	12	Guide	762919	762919	762919	762919
●	13	Shims	762920	762920	762920	762920
	14	Spring (125 bar)	762928	762928	762928	762928
		Spring (245 bar)	762929	762929	762929	762929
		Spring (350 bar)	762930	762930	762930	762930
●	15	Washer	762921	762921	762921	762921
●	16	Poppet	290057	290057	290057	290057

Figure 25. Parts Tabulation

Item No.	Part Description	Valve Size (mm)			
		16	25	32	40
17	Plug	329463	329463	329463	329463
	Torque to (lb. ft.)	(42)	(42)	(42)	(42)
▲ 18	O-Ring	263497	263497	263497	263497
● 19	Seat	762922	762922	762922	762922
20	Plug	398071	398071	398071	398071
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
▲ 21	O-Ring	263492	263492	263492	263492
22	Plug	398071	——	——	398071
	Torque to (lb. ft.)	(7.4)	——	——	(7.4)
▲ 23	O-Ring	——	——	——	263492
* 24	Orifice (Std)	——	——	——	635154
■ 25	Cover (Type C)	579982	580266	731077	580327
	Cover (Type C1)	730455	580265	731078	580326
* 26	Orifice (Std)	635135	635152	635153	
27	Roll Pin	168319	226797	226797	226797
28	Nameplate	199082	199082	199082	199082
29	Screw (2 Req'd)	36212	36212	36212	36212
⊖ 30	Plug	——	——	——	812
* 31	Orifice (Std.)	635138	635156	635158	635159
▲ 32	O-Ring (3 Req'd)	262330	262331	262332	262334
▲ 33	O-Ring	262360	262401	262406	262410
▲ 34	Back-up Ring	277652	277707	277712	277716

Note: 1 lb. ft. = 1.36 Nm.
14.5 psi = 1 bar

▲ – Included in seal kit (Table 13)
■ – Not available for sale
* – Refer to Table 10 for other orifice sizes
◆ – Included in adjuster rod kit 941472
● – Included in poppet kit 941473
⊖ – Do Not Remove

Figure 25. Parts Tabulation (Continued)

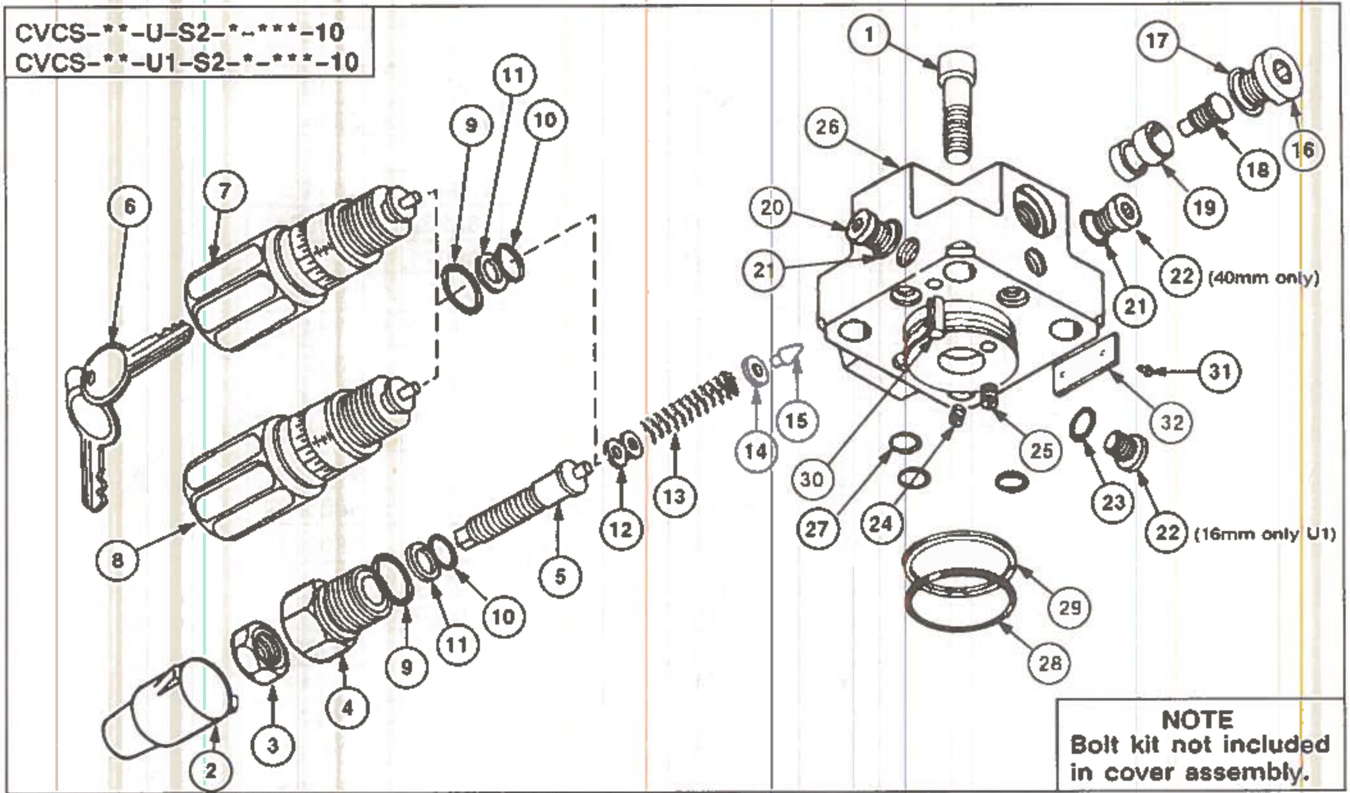


Figure 26. Unloading Cover Assembly (U & U1 Function)

Item No.	Part Description	Valve Size (mm) 16/25/32/40
2	Cap	762607
3	Lock Nut	764177
4	Adaptor	579692
	Torque to (lb. ft.)	(75)
5	Adjusting Rod	764176
6	Keys (1 set of 2)	814573
7	Micrometer/key S/A (K)	637463
8	Micrometer S/A (M)	637462
▲ 9	O-Ring	262355
▲ 10	O-Ring	262350
▲ 11	Back-up Ring	197588
● 12	Shims	762920
13	Spring (125 bar)	762928
	Spring (245 bar)	762929
	Spring (350 bar)	762930
● 14	Washer	762921
● 15	Poppet	290057
16	Plug	329463
	Torque to (lb. ft.)	(42)
▲ 17	O-Ring	263497
● 18	Plunger	815031
● 19	Seat	815030
20	Plug	398071
	Torque to (lb. ft.)	(7.4)
21	O-Ring	263492

Item No.	Part Description	Valve Size (mm) 16	25	32	40
1	Bolt Kit – inch	590702	590704	590713	590706
	– mm	590703	590705	590718	590707
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)
22	Plug	398071	——	——	398071
	Torque to (lb. ft.)	(7.4)	——	——	(7.4)
23	O-Ring	——	——	——	263492
⊖ 24	Plug	——	——	——	812
* 25	Orifice (Standard)	635138	635156	635157	635158
■ 26	Cover (Type U)	579982	580266	731077	580327
	Cover (Type U1)	730455	580265	731078	580326
▲ 27	O-Ring (3 Req'd)	262330	262331	262332	262334
▲ 28	O-Ring	262360	262401	262406	262410
▲ 29	Back-up Ring	277652	277707	277712	277716
30	Roll Pin	168319	226797	226797	226797
31	Screw (2 Req'd)	36212	36212	36212	36212
32	Nameplate	199082	199082	199082	199082

Note: 1 lb. ft. = 1.36 Nm.
14.5 psi = 1 bar

▲ - Included in seal kit (Table 13)
● - Included in poppet kit 926591
■ - Not available for sale
⊖ - Do Not Remove
* - Refer to Table 10 for other orifice sizes

Figure 26. Parts Tabulation

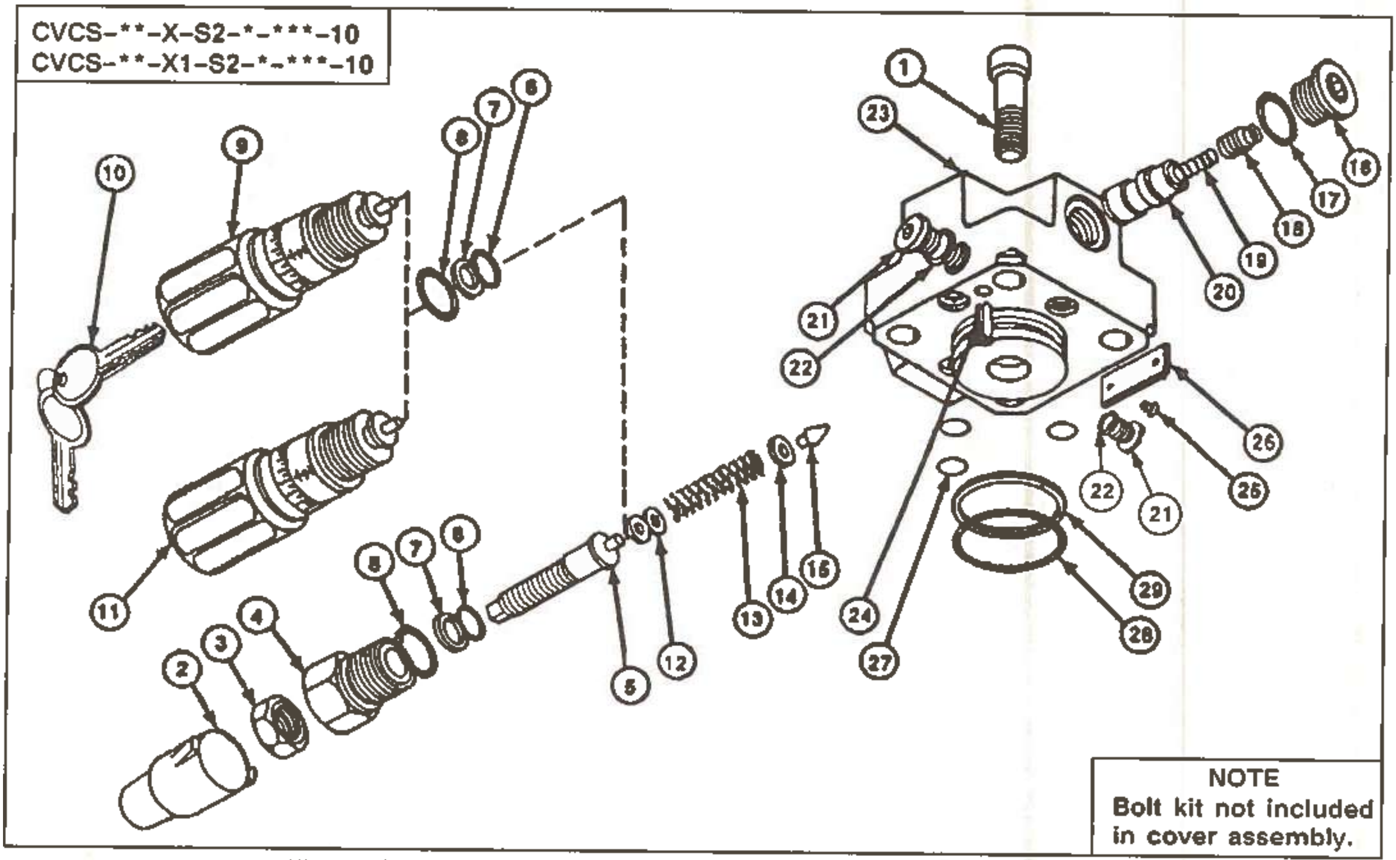


Figure 27. Pressure Reducing Cover Assembly (X & X1 Function)

Item No.	Part Description	Valve Size(mm) 16	25
1	Bolt Kit – inch	590702	590704
	– mm	590703	590705
	Torque to (lb.ft.)	(26)	(81)
◆ 2	Cap	762607	762607
◆ 3	Lock Nut	764177	764177
◆ 4	Adapter	579692	579692
◆ 5	Adjuster Rod	764176	764176
▲ 6	O-Ring	262350	262350
▲ 7	Back-Up Ring	197588	197588
▲ 8	O-Ring	262355	262355
9	Micrometer/keyS/A (K)	637463	637463
10	Keys (1 set of 2)	814573	814573
11	Micrometer (M)	637462	637462
● 12	Shims	762920	762920
13	Spring (125 bar)	762928	762928
	Spring (245 bar)	762929	762929
	Spring (350 bar)	762930	762930
● 14	Washer	762921	762921

Item No.	Part Description	Valve Size(mm) 16	25
● 15	Poppet	290057	290057
16	Plug Torque to (lb.ft.)	579921 (42)	579921 (42)
▲ 17	O-Ring	263497	263497
● 18	Spool	764172	764172
● 19	Spring	544103	544103
● 20	Seat	764171	764171
21	Plug Torque to (lb.ft.)	398071 (7.4)	398071 (7.4)
▲ 22	O-Ring	263492	263492
■ 23	Cover (Type X)	579982	580266
	Cover (Type X1)	730455	580265
24	Roll Pin	168319	226797
25	Screw (2 Req'd)	36212	36212
26	Nameplate	199082	199082
▲ 27	O-Ring (3 Req'd)	262330	262331
▲ 28	O-Ring	262360	262401
▲ 29	Back-Up Ring	271732	271787

NOTE: 1 lb.ft. = 1.36 Nm.
14.5 psi = 1 bar
▲ Included in Seal Kit (Table 13)

● Included in Poppet Kit 926288
◆ Included in Adjuster Rod Kit 926227
■ Not Available for Sale

Figure 27. Parts Tabulation

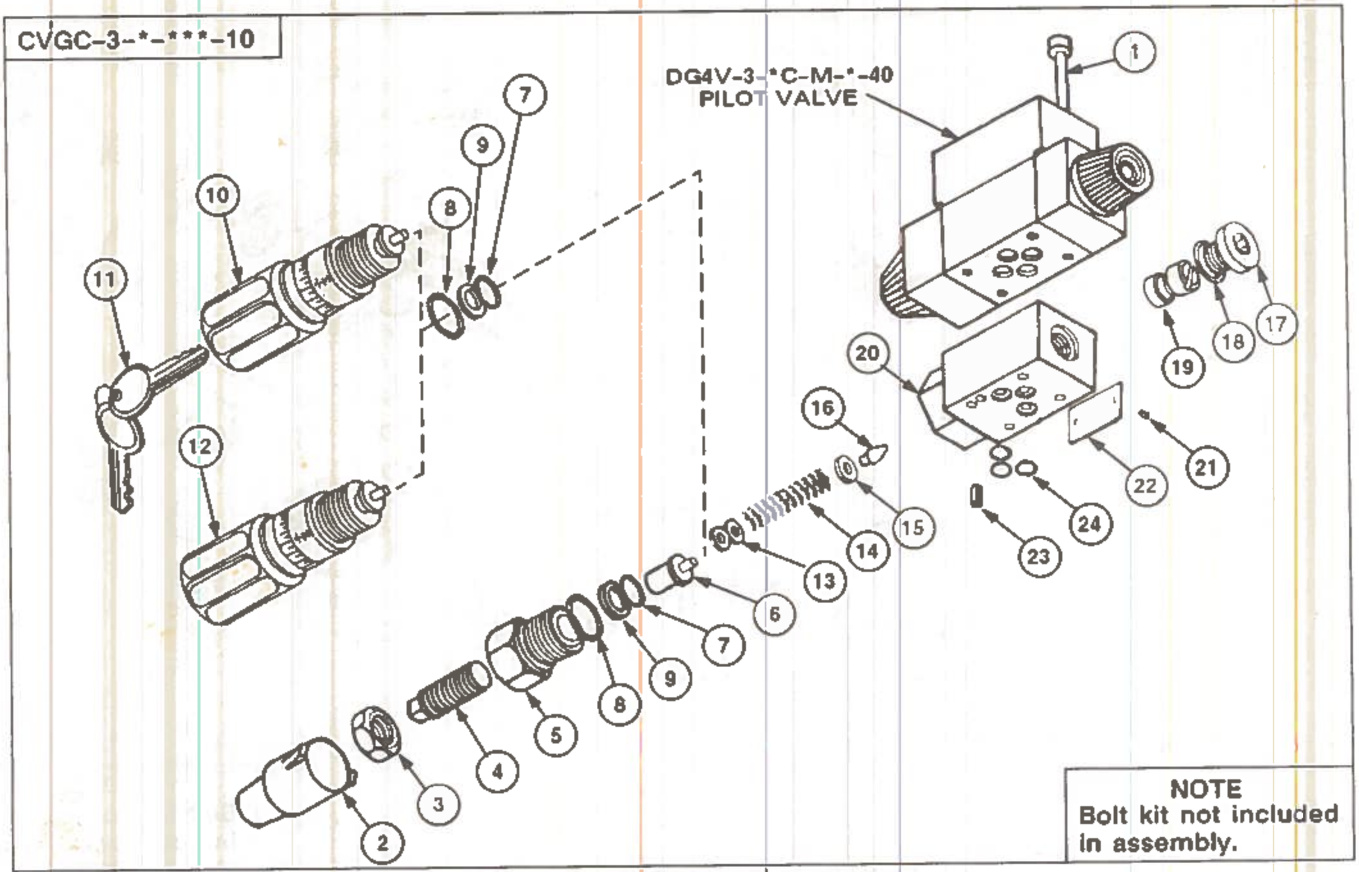


Figure 28. CVGC Pressure Relief Module

Item No.	Part Description	Part No.
1	Bolt kit (See Appendix)	
◆ 2	Cap	762607
◆ 3	Lock Nut	761190
◆ 4	Adjuster Rod	762918
◆ 5	Adaptor	579922
	Torque to (lb. ft.)	(81)
◆ 6	Guide	762919
▲ 7	O-Ring	262350
▲ 8	O-Ring	262355
▲ 9	Back-up Ring	197588
10	Micrometer/key S/A (K)	637463
11	Keys (1 set of 2)	814573
12	Micrometer (M)	637462
● 13	Shims	762920

Item No.	Part Description	Part No.
14	Spring (125 bar)	762928
	Spring (250 bar)	762929
	Spring (350 bar)	762930
● 15	Washer	762921
● 16	Poppet	290057
17	Plug	329463
	Torque to (lb. ft.)	(42)
▲ 18	O-Ring	263497
● 19	Seat	762922
■ 20	Body	580036
21	Screw (2 req'd)	36212
22	Nameplate	199082
23	Pin	472553
▲ 24	O-Ring	262431

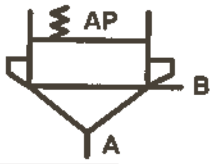
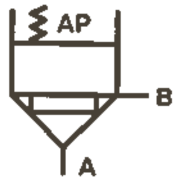
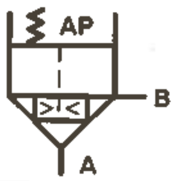
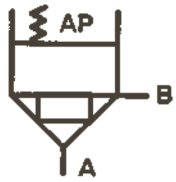
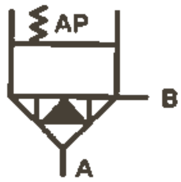
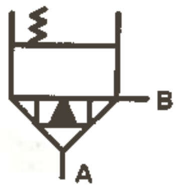
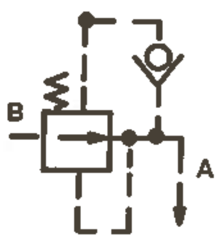
Note: 1 lb. ft. = 1.36 Nm.
14.5 psi = 1 bar

▲ – Included in seal kit 920258
◆ – Included in adjuster rod kit 941472
● – Included in poppet kit 941473
■ – Not available for sale

Note:
To obtain a complete CVGC module, order by the model code on the nameplate.

Figure 28. Parts Tabulation

C. Cartridge Insert Disassembly & Assembly

Figure Number	Insert Type	Function	Functional Symbol	Insert Model Code
31 33	Directional	D10		CVI-**-D10-2-** CVI-**-D10-2-L-** CVI-**-D10-2-M-** CVI-**-D10-2-H-**
31	Directional	D11		CVI-**-D11-2-L-** CVI-**-D11-2-M-** CVI-**-D11-2-H-**
31	Directional with Orifice	D11		CVI-**-D11-2-L-**-** CVI-**-D11-2-M-**-** CVI-**-D11-2-H-**-**
31	Directional	D20		CVI-**-D20-2-L-** CVI-**-D20-2-M-** CVI-**-D20-2-H-**
31	Restrictor	R		CVI-**-R-2-L-** CVI-**-R-2-M-** CVI-**-R-2-H-**
31	Flow Control	F		CVI-**-F-2-L-** CVI-**-F-2-M-** CVI-**-F-2-H-**
32	Pressure Reducing	X		CVI-**-X1-2-**

Perform the following steps. Refer to Figure 16.

1. Remove insert spring and determine the spring cracking pressure. Refer to Section V-C for instructions.

2. Use a suitable extractor and remove the poppet from the sleeve. Apply the extractor tool at the poppet groove as shown in Figure 29.

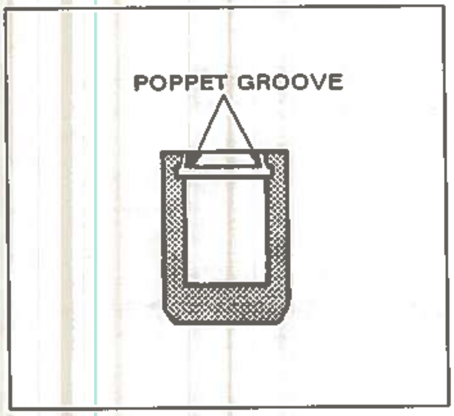


Figure 29. Insert Poppet

3. Determine poppet area ratio. Refer to Section V-C (Figure 17) for instructions.

4. Remove the sleeve from the manifold block. Apply a suitable extractor tool at the groove on smaller valve size (16mm through 32mm) pressure reducing inserts, or at the port holes for other inserts. See Figure 30. Apply the extractor tool to the two tapped holes on larger valve sizes (40mm through 63mm). See Figure 30a.

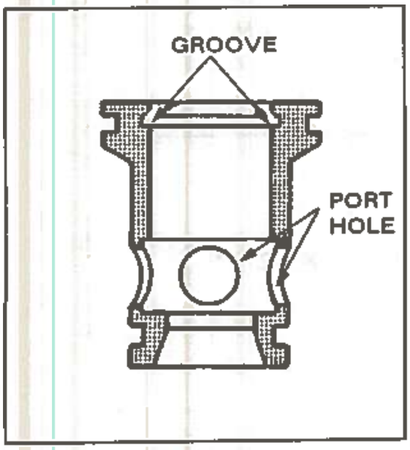


Figure 30a. Insert Sleeve (40, 50, 63mm)

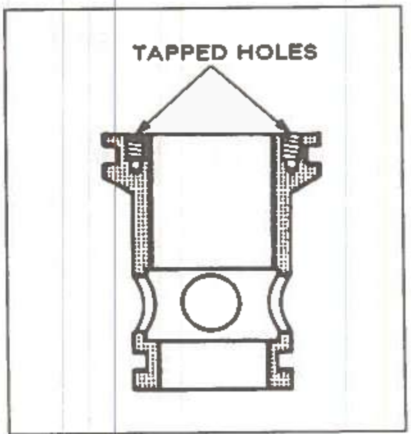


Figure 30. Insert Sleeve (16, 25, 32mm)

5. Determine valve size by measuring largest diameter of sleeve. Refer to the number/letter code stamped on the sleeve or Section V-C.

6. Remove o-rings and back-up rings from sleeve.

7. Inspect insert parts for damage or excessive wear.

8. If required, obtain a new insert kit from Table 11. The insert kit contains a new sleeve, poppet, spring, and seals for the sleeve.

9. Refer to Table 12 if a new insert spring is required.

10. If a new insert kit is not required, obtain a new seal kit from table 13 and install o-rings and back-up rings on the sleeve. The seal kit includes all necessary seals for the sleeve and the cover assembly). Refer to Figure 16 for seal orientation.

11. Lubricate the seals with clean hydraulic fluid. Orient the sleeve port holes with the port holes inside the manifold block. Install the sleeve into the manifold block with a suitable piece of aluminum or nylon.

12. Install the poppet into sleeve.

13. Install the spring into poppet.

Area Ratio	Crack Press. (psi)	Insert Kit Number						Insert Model Code
		16mm	25mm	32mm	40mm	50mm	63mm	
1:1	33.4	995105		——		——	——	CVI-**-D10-2-11
1:1	33.4		995298		995144			CVI-**-D10-2-30
1:1	40.6	——	——	995080	——	——	——	CVI-**-D10-2-11
1:1.1	4.3	580019	580064	815250	589929	598111	589134	CVI-**-D11-2-L-10
1:1.1	20.3	——	——	815241	——	——	——	CVI-**-D11-2-M-10
1:1.1	24.7	580020	580065	——	580026	589112	589135	CVI-**-D11-2-M-10
1:1.1	36.3	580021	580066	——	579931	589113	589136	CVI-**-D11-2-H-10
1:1.1	39.2	——	——	815242	——	——	——	CVI-**-D11-2-H-10
1:2	7.3	580022	580067	815243	579932	589114	589137	CVI-**-D20-2-L-10
1:2	36.3	580023	580068	815244	579933	589115	589138	CVI-**-D20-2-M-10
1:2	72.5	580024	580069	——	579934	589116	589139	CVI-**-D20-2-H-10
1:2	72.5	——	——	815245	——	——	——	CVI-**-D20-2-H-10
1:1.1	4.3	580028	580073	815249	579938	——	——	CVI-**-D11-2-L-10
1:1.1	20.3	——	——	815250	——	——	——	CVI-**-D11-2-M-10
1:1.1	24.7	580029	580074	——	579939	——	——	CVI-**-D11-2-M-10
1:1.1	36.3	580030	580075	815251	579940	——	——	CVI-**-D11-2-H-10
1:2	7.3	580025	580070	815246	579935	589117	589140	CVI-**-F-2-L-10
1:2	36.3	580026	580071	815247	579936	589118	589141	CVI-**-F-2-M-10
1:2	72.5	——	——	——	579937	589119	589143	CVI-**-F-2-H-10
1:2	7.3	675987	676004	479142	676194	455998	456013	CVI-**-R-2-L-10
1:2	36.3	675988	676005	479143	676195	455999	456014	CVI-**-R-2-M-10
1:2	72.5	675989	676006	479144	676196	455997	456012	CVI-**-R-2-H-10
1:1	3.8	995103	995109	——	995108	——	——	CVI-**-D10-2-L-10
1:1	21.7	455919	995110	——	995104	——	——	CVI-**-D10-2-M-10
1:1	32.8	995105	995298	995080	995144	——	——	CVI-**-D10-2-H-10
		580360	580421	——	——	——	——	CVI-**-X-2-10

Note: 14.5 psi = 1 bar

Table 11. Insert Kits

Area Ratio	Cracking Pressure (psi)	Valve Size/ Insert Spring					
		16mm	25mm	32mm	40mm	50mm	63mm
1:1	3.8 – 4.3	761564	761567	—	761570	—	—
	21.7	761565	761568	—	761571	—	—
	29.0 – 33.4	761566	761569	—	761572	—	—
	36.3	—	—	—	—	763676	—
	40.6	—	—	815222	—	—	—
1:1.1	4.3	761564	761567	815220	761570	763674	763712
	20.3	—	—	815221	—	—	—
	24.7	761565	761568	—	761571	763675	763713
	36.3	761566	761569	—	761572	763676	763714
	39.2	—	—	815222	—	—	—
1:2	7.3	761564	761567	815220	761570	763674	763712
	36.3	761565	761568	815221	761571	763675	763713
	72.5	761566	761569	815222	761572	763676	763714

Note: 14.5 psi = 1 bar

Table 12. Insert Springs

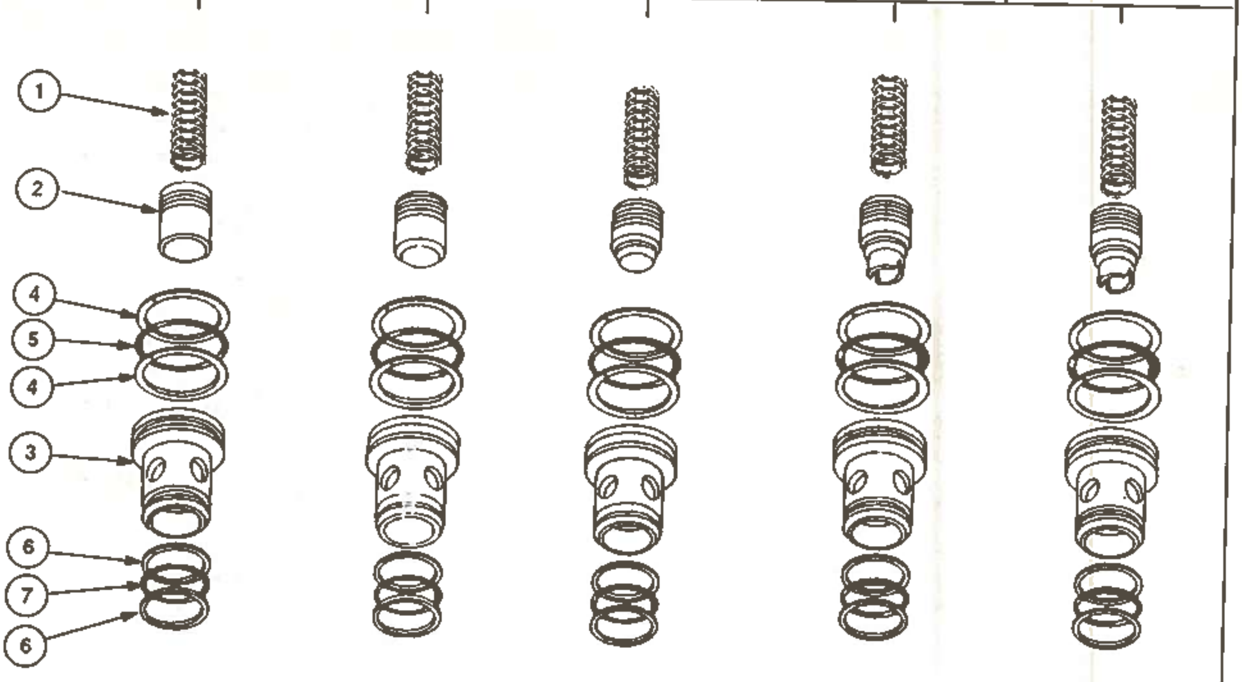
Valve Size (mm)	16	25	32	40	50	63
Seal Kit	920173	920175	920365	920177	920208	920210

NOTE

Replacement seal kits include F3 seals only. Kits include all necessary seals for cartridge insert and cartridge cover assembly on any type of cartridge valve. If a pilot valve is mounted on the cover assembly, refer to Table 3 and obtain the pilot valve seal kit (includes interface seals) from the pilot valve parts drawing.

Table 13. Seal Kits

Function	D10	D11	D20	F	R
Area Ratio	1:1	1:1.1	1:2	1:2	1:2



Item No.	Part Name	Function → / Size(mm) ↓	D10	D11	D20	F	R
1	Spring	16-63	See Table 12				
■ 2	Poppet	16	994806	760970	760971	760974	987452
		25	994807	760856	760857	760858	987677
		32	995082	815232	815233	815234	479141
		40	994808	760892	760894	760896	987678
		50	479026	763671	763672	763673	637263
		63	—	763709	763710	763711	637264
■ 3	Sleeve	16	994809	580037	580038	580038	580038
		25	994810	580078	580079	580079	580079
		32	995801	815230	815231	815231	815231
		40	994811	579942	579943	579943	579943
		50	478953	589101	589102	589102	589102
		63	—	589103	589104	589104	589104

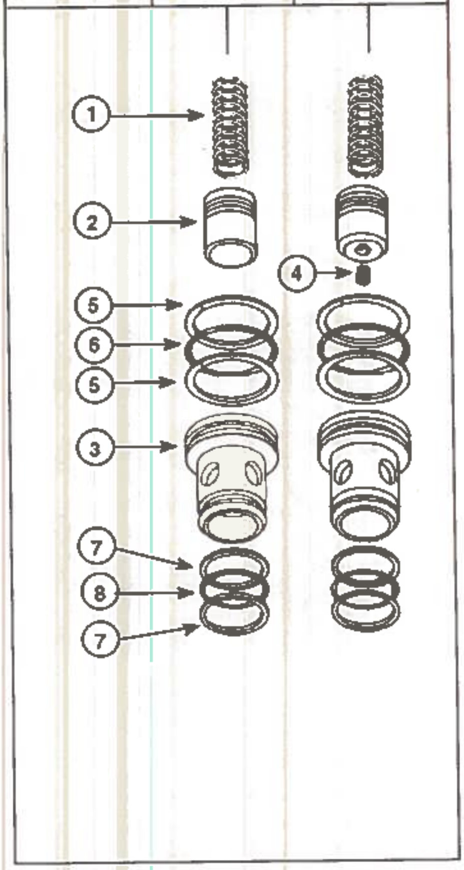
Item No.	Part Name	Valve Size (mm) 16	25	32	40	50	63
■▲4	BU-Ring	277652	277707	277712	277716	277781	277790
■▲5	O-Ring	262360	262401	262406	262410	262467	262476
■▲6	BU-Ring	277648	277653	277707	277710	277714	277781
■▲7	O-Ring	262356	262361	262401	262404	262408	262467

▲ – Included in seal kit (Table 13)

■ – Individual insert parts not available for sale.
Obtain insert kit noted in Table 11.

Figure 31. Cartridge Insert Parts for Directional, Shuttle & Pilot Operated Check

Function	D10	D11
Area Ratio	1:1	1:1.1 (w/Orifice)



Item No.	Part Name	Size (mm)	Function	
			D10	D11
1	Spring	16-40	See Table 12	
■ 2	Poppet	16	994806	761910
		25	994807	761911
		32	995082	815236
		40	994808	761912
■ 3	Sleeve	16	994809	580037
		25	994810	580078
		32	995801	815230
		40	994811	579942

Item No.	Part Name	Valve Size (mm)			
		16	25	32	40
	Orifice Dia. (mm)	1.0	1.2	1.2	1.4
■ * 4	Orifice (Std.)	986032	986037	986037	815407

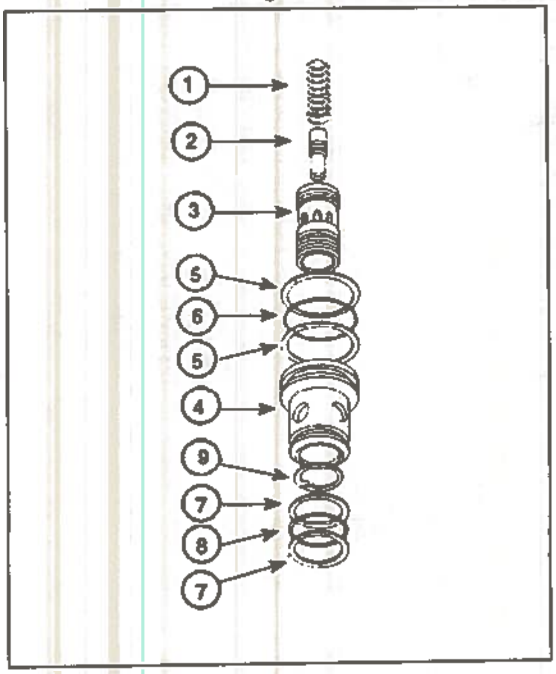
Item No.	Part Name	Valve Size (mm)			
		16	25	32	40
■▲ 5	Back-up Ring	277652	277707	277712	277716
■▲ 6	O-Ring	262360	262401	262406	262410
■▲ 7	Back-up Ring	277648	277653	277707	277710
■▲ 8	O-Ring	262356	262361	262401	262404

▲ – Included in seal kit (Table 13)

■ – Individual insert parts not available for sale. Obtain insert kit noted in Table 11.

* – This orifice has metric threads. Refer to European service drawings (Table 2) for other orifice sizes.

Figure 32. Cartridge Insert Parts for Pressure Relief & Unloading



Item No.	Part Name	Valve Size (mm)	
		16	25
1	Spring	764166	764309
■-⊖-2	Check Valve S/A	764134	764134
■ 3	Spool	764164	764307
■ 4	Sleeve	580366	580432
■▲ 5	Back-up Ring	277652	277707
■▲ 6	O-Ring	262360	262401
■▲ 7	Back-up Ring	277648	277653
■▲ 8	O-Ring	262356	262361
■ 9	Retaining Ring	92757	103989

▲ – Included in seal kit (Table 13)

■ – Individual insert parts not available for sale. Obtain insert kit noted in Table 11.

-⊖- – Do not remove. Check valve S/A is bonded into spool with special compound.

Figure 33. Cartridge Insert Parts for Pressure Reducing

APPENDIX

The following diagrams (Figures 34, 35 and 36) illustrate various cartridge valve arrangements and related bolt kits for cartridge valves with pilot valve interface covers.

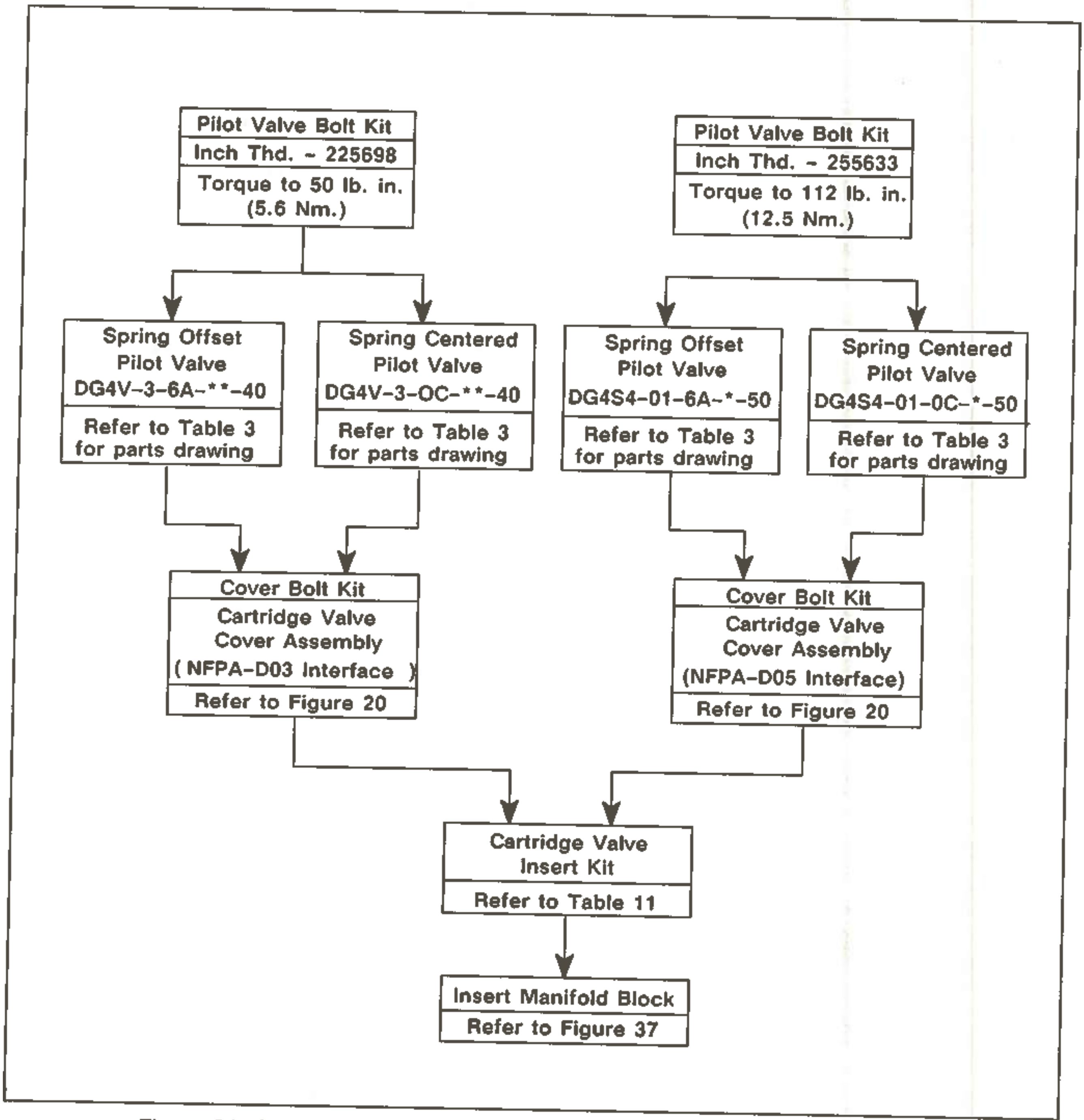


Figure 34. Cartridge Valve Arrangement for Directional Cover (NFPA-D03/D05)

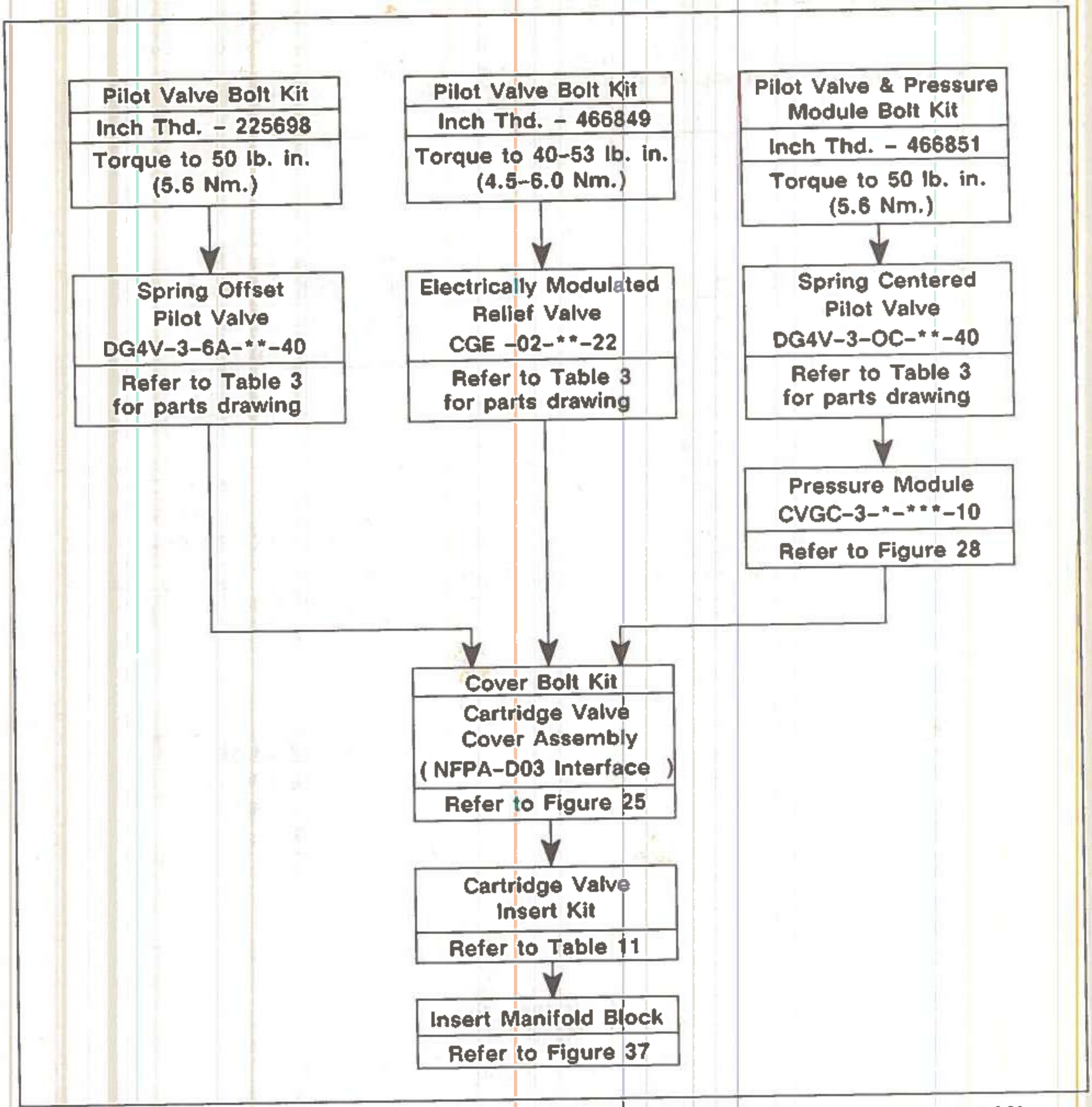


Figure 35. Cartridge Valve Arrangement for Pressure Relief Cover (NFPA-D03)

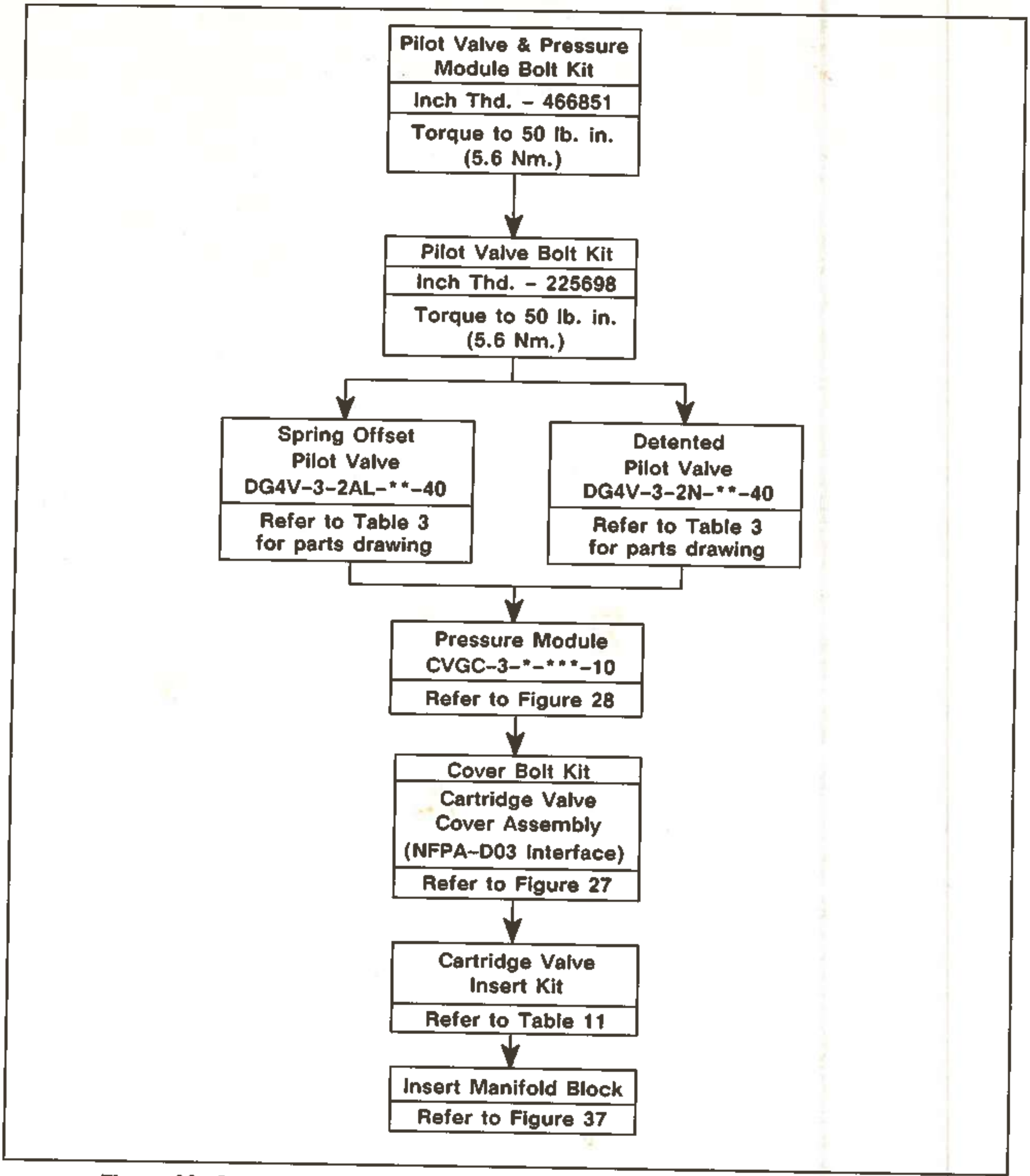
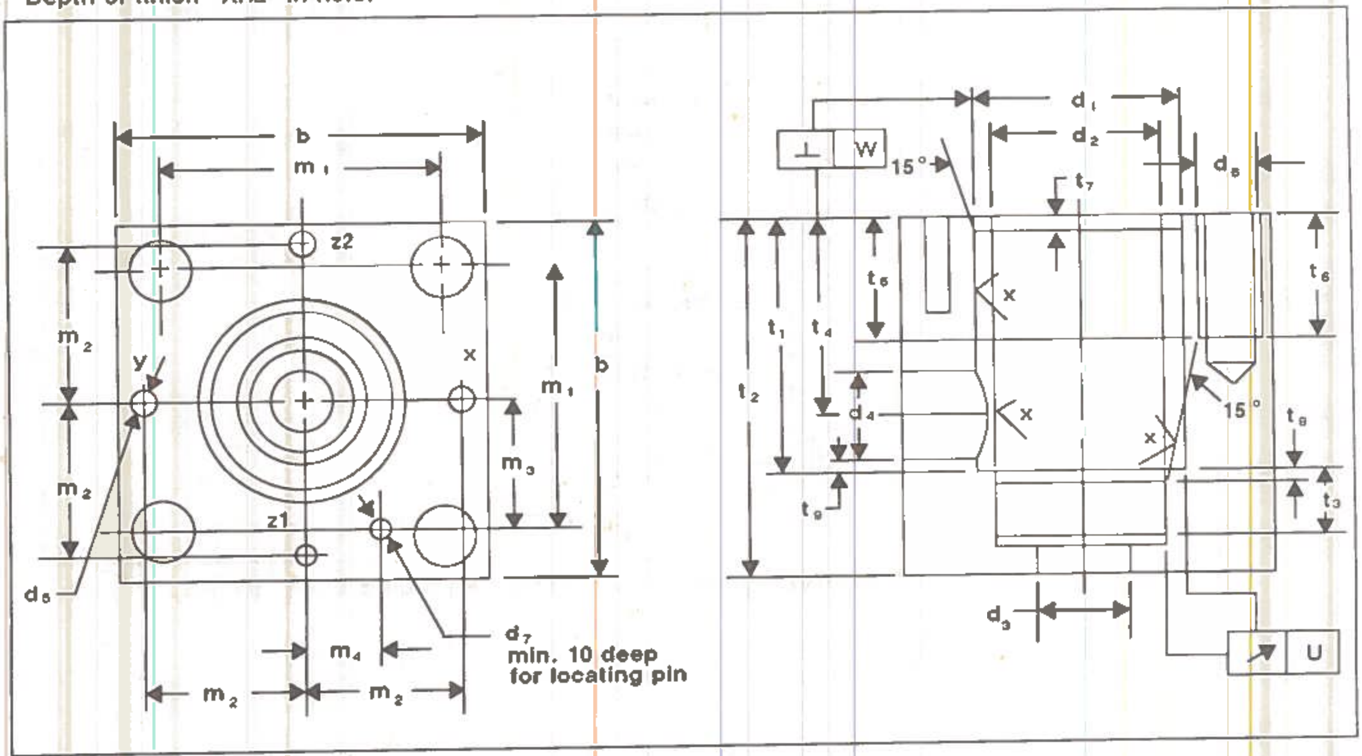


Figure 36. Cartridge Valve Arrangement for Pressure Reducing Cover (NFPA-D03)

Manifold Block – Recess Dimensions to DIN 24342

Dimension	Nominal Size – Metric (inches)					
	16mm	25mm	32mm	40mm	50mm	63mm
b	65(2.56)	85(3.35)	102(4.01)	125(4.92)	140(5.51)	180(7.09)
d_1 min.	32.000(1.2598)	45.000(1.7717)	60.000(2.3622)	75.000(2.9528)	90.000(3.5433)	102.000(4.7244)
max.	32.025(1.2608)	45.025(1.7726)	60.030(2.3633)	75.030(2.9539)	90.035(3.5447)	120.035(4.7258)
d_2 min.	25.000(0.9843)	34.000(1.3386)	45.000(1.7716)	55.000(2.1653)	68.000(2.6772)	90.000(3.5433)
max.	25.021(0.9851)	34.025(1.3396)	45.030(1.7727)	55.030(2.1665)	68.030(2.6783)	90.035(3.5447)
d_3 max.	16(.63)	25(.98)	32(1.26)	40(1.57)	50(1.97)	63(2.48)
d_4 min.	16(.63)	25(.98)	32(1.26)	40(1.57)	50(1.97)	63(2.48)
max.	25(.98)	32(1.26)	40(1.57)	50(1.97)	63(2.48)	80(3.15)
d_5 max.	4(.157)	6(.236)	8(.314)	10(.393)	10(.393)	12(.472)
d_6 max. Thd.	M8	M12	M16	M20	M20	M30
	(.3125-18)	(.500-13)	(.6250-11)	(.750-10)	(.750-10)	(1.250-7)
d_7 + 0.2(+.008)	4.000(.1575)	6.000(.2362)	6.000(.2362)	6.000(.2362)	8.000(.3150)	8.000(.3150)
	4.180(.1646)	6.180(.2433)	6.180(.2433)	6.180(.2433)	8.220(.3236)	8.220(.3236)
m_1 + 0.2(+.008)	46(1.811)	58(2.284)	70(2.755)	85(3.347)	100(3.937)	125(4.921)
m_2 + 0.2(+.008)	25(.984)	33(1.299)	41(1.614)	50(1.969)	58(2.284)	75(2.953)
m_3 + 0.2(+.008)	23(.906)	29(1.142)	35(1.377)	42.5(1.674)	50(1.969)	62.5(2.461)
m_4 + 0.2(+.008)	10.5(.414)	16(.630)	17(.669)	23(.906)	30(1.181)	38(1.496)
t_1 + 0.1(+.004)	43(1.692)	58(2.283)	70(2.755)	87(3.425)	100(3.937)	130(5.118)
t_2 + 0.1(+.004)	56(2.204)	72(2.834)	85(3.346)	105(4.133)	122(4.803)	155(6.103)
t_3*	11(.433)	12(.472)	13(.511)	15(.590)	17(.669)	20(.787)
t_4	34(1.338)	44(1.732)	52(2.047)	64(2.519)	72(2.834)	95(3.740)
t_4 to d_4 max.	29.5(1.161)	40.5(1.594)	48(1.889)	59(2.322)	65.5(2.578)	86.5(3.405)
t_5*	20(.787)	30(1.181)	30(1.181)	30(1.181)	35(1.377)	40(1.574)
t_6 Thd. Depth	20(.787)	25(.984)	35(1.377)	35(1.377)	40(1.574)	55(2.165)
t_7	2(.078)	2.5(.098)	2.5(.098)	3(.118)	4(.157)	4(.157)
t_8	2(.078)	2.5(.098)	2.5(.098)	3(.118)	3(.118)	4(.157)
t_9	1.5(.059)	1.5(.059)	1.5(.059)	3(.118)	3(.118)	3(.118)
t_{11} max.	25(.98)	31(1.220)	42(1.653)	53(2.086)	53(2.086)	75(2.953)
U	0.03(.0012)	0.03(.0012)	0.03(.0012)	0.05(.0020)	0.05(.0020)	0.05(.0020)
W	0.05(.0020)	0.05(.0012)	0.1(.0039)	0.1(.0039)	0.1(.0039)	0.2(.0079)
XRa	1.6 micrometre(63 microinches)					

* Depth of finish "XRa" in hole.



STANDARD ORIFICE LOCATIONS

CVCS 16 ORIFICE LOCATION

MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVCS-16-A-S2-*-10	XX	XX	XX	1.0	XX	XX
CVCS-16-C-S2-****-10	XX	1.2	XX	0.8	-	XX
CVCS-16-C1-S2-****-10	XX	1.2	-	0.8	-	XX
CVCS-16-D1-S2-10	1.0	-	XX	-	-	-
CVCS-16-N-S2-10	XX	XX	XX	1.0	XX	XX
CVCS-16-PC-S2-10	XX	1.0	XX	XX	-	XX
CVCS-16-U-S2-****-10	XX	1.2	XX	-	-	XX
CVCS-16-U1-S2-****-10	XX	1.2	-	-	-	XX
CVCS-16-W-S2-10	XX	1.0	XX	-	XX	-
CVCS-16-W11-S2-10	1.0	-	PLUG	XX	-	PLUG
CVCS-16-W31-S2-10	1.0	-	PLUG	-	XX	XX
CVCS-16-X-S2-****-10	XX	-	XX	-	-	XX
CVCS-16-X1-S2-****-10	XX	-	-	-	-	XX

CVCS 25 ORIFICE LOCATION

MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVCS-25-AD1-S2-*-10-NC	1.2	XX	PLUG	XX	XX	XX
CVCS-25-AD1-S2-*-10-NO	PLUG	XX	1.2	XX	XX	XX
CVCS-25-A-S2-*-10	XX	XX	XX	1.2	XX	XX
CVCS-25-C-S2-****-10	XX	1.2	XX	0.8	-	XX
CVCS-25-C1-S2-****-10	XX	1.2	-	0.8	-	XX
CVCS-25-D1-S2-10	1.2	-	-	-	-	-
CVCS-25-N-S2-10	XX	XX	XX	1.2	XX	XX
CVCS-25-PC-S2-10	XX	1.2	XX	XX	-	XX
CVCS-25-U-S2-****-10	XX	1.2	XX	-	-	XX
CVCS-25-U1-S2-****-10	XX	1.2	-	-	-	XX
CVCS-25-W-S2-10	XX	1.2	XX	-	-	-
CVCS-25-W11-S2-10	1.2	-	PLUG	XX	XX	PLUG
CVCS-25-W31-S2-10	1.2	-	PLUG	-	XX	XX
CVCS-25-X-S2-****-10	XX	-	XX	-	-	XX
CVCS-25-X1-S2-****-10	XX	-	-	-	-	XX

CVCS 32 ORIFICE LOCATION

MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVCS-32-A-S2-W-10	XX	XX	XX	1.3	XX	XX
CVCS-32-C-S2-****-10	XX	1.4	XX	0.9	-	XX
CVCS-32-C1-S2-****-10	XX	1.4	-	0.9	-	XX
CVCS-32-D1-S2-10	1.3	-	XX	-	-	-
CVCS-32-N-S2-10	XX	XX	XX	1.3	XX	XX
CVCS-32-PC-S2-10	XX	1.3	XX	XX	-	XX
CVCS-32-U-S2-****-10	XX	1.3	XX	-	-	XX
CVCS-32-U1-S2-****-10	XX	1.3	-	-	-	XX
CVCS-32-W-S2-10	XX	1.3	XX	-	-	-
CVCS-32-W11-S2-10	1.3	-	PLUG	XX	XX	PLUG
CVCS-32-W31-S2-10	1.3	-	PLUG	-	XX	XX

CVCS 40 ORIFICE LOCATION

MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVCS-40-AD1-S2-W-10-NC	1.4	XX	PLUG	XX	XX	XX
CVCS-40-AD1-S2-W-10-NO	PLUG	XX	1.4	XX	XX	XX
CVCS-40-A-S2-W-10	XX	XX	XX	1.4	XX	XX
CVCS-40-C-S2-****-10	XX	1.5	XX	1.0	-	XX
CVCS-40-C1-S2-****-10	XX	1.5	XX	1.0	-	XX
CVCS-40-D1-S2-10	1.4	-	-	-	-	-
CVCS-40-N-S2-10	XX	XX	XX	1.4	XX	XX
CVCS-40-PC-S2-10	XX	1.4	XX	XX	-	XX
CVCS-40-U-S2-****-10	XX	1.4	XX	-	-	XX
CVCS-40-U1-S2-****-10	XX	1.4	-	-	-	XX
CVCS-40-W-S2-10	XX	1.4	XX	-	-	-
CVCS-40-W11-S2-10	1.4	-	PLUG	XX	XX	PLUG
CVCS-40-W31-S2-10	1.4	-	PLUG	-	XX	XX

CVCS 50 ORIFICE LOCATION

MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVCS-50-A-S2-W-10	XX	-	XX	1.6	XX	XX
CVCS-50-D2-S2-10	XX	1.6	XX	-	-	-
CVCS-50-N-S2-10	XX	-	XX	1.6	XX	XX

CVCS 63 ORIFICE LOCATION

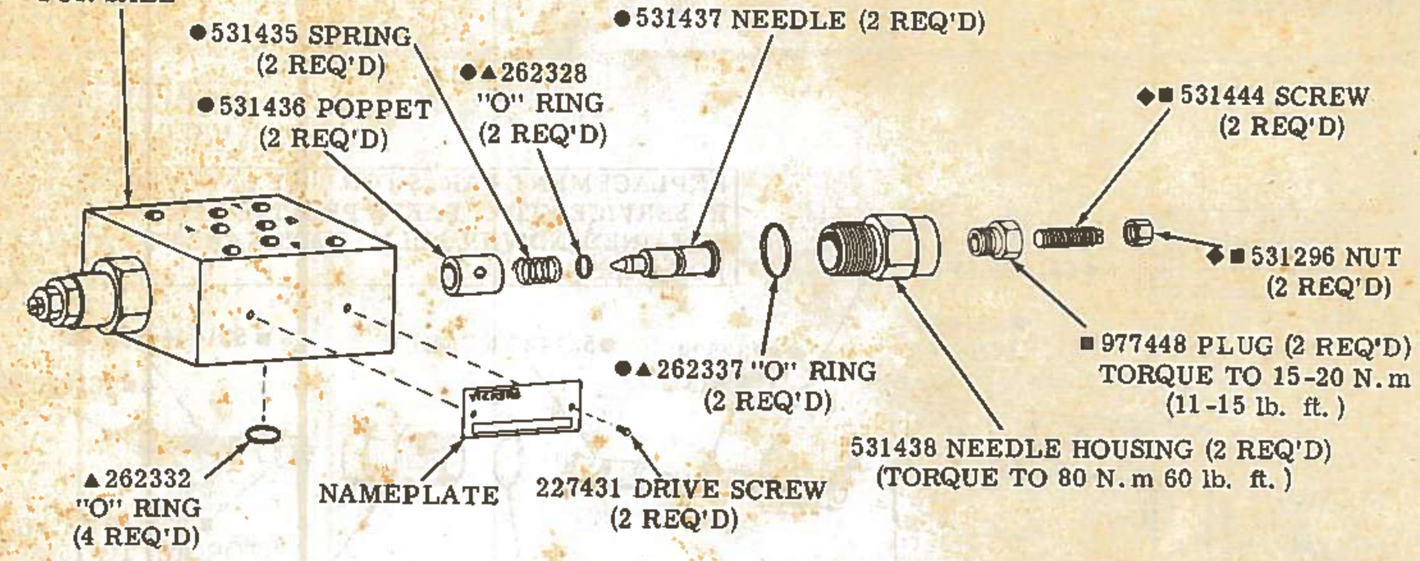
MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVCS-63-A-S2-W-10	XX	-	XX	1.8	XX	XX
CVCS-63-D2-S2-10	XX	1.8	XX	-	-	-
CVCS-63-N-S2-10	XX	-	XX	1.8	XX	XX

Example: XX = Orifice location not available
- = Optional orifice location
1.2 = Standard orifice (mm) location
PLUG = Solid Plug

MODEL	BODY
X	531434
Y	531433

NOT AVAILABLE FOR SALE

REPLACEMENT PARTS FOR THIS UNIT ARE AVAILABLE IN SERVICE KITS. PARTS PREFIXED BY AN ◆ CAN BE OBTAINED INDIVIDUALLY. BODIES ARE NOT AVAILABLE FOR SALE.

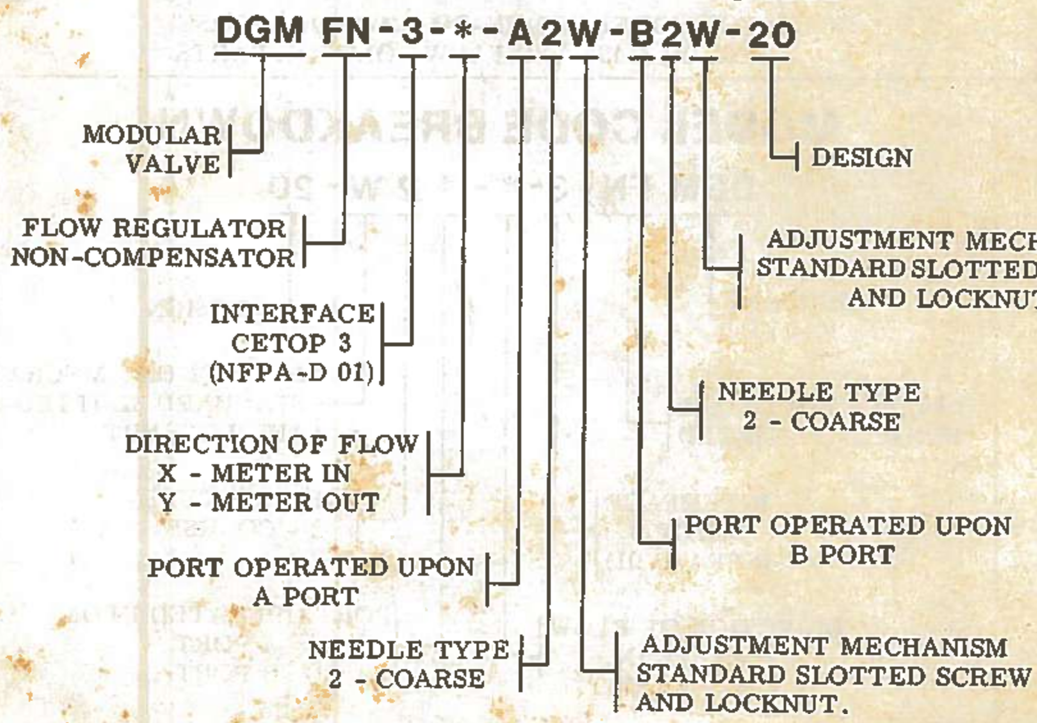


●INCLUDED IN 942447 NEEDLE VALVE KIT

▲INCLUDED IN 920084 SEAL KIT

■ONE EACH INCLUDED IN ADJUSTMENT SCREW KIT 942445

MODEL CODE BREAKDOWN



Service Parts Information

VICKERS
A TRINOVA COMPANY

FLOW CONTROL MODULE

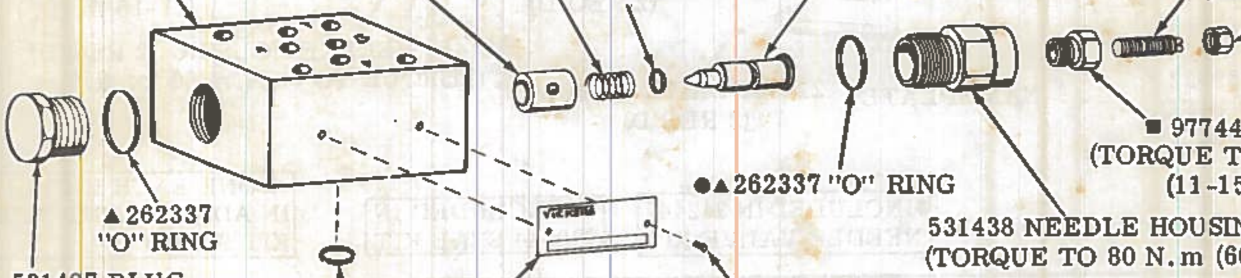
DGMFN-3-*-*2*-20

●INCLUDED IN 942447 NEEDLE VALVE KIT

REPLACEMENT PARTS FOR THIS UNIT ARE AVAILABLE IN SERVICE KITS. PARTS PREFIXED BY AN ◆ CAN BE OBTAINED INDIVIDUALLY. BODIES ARE NOT AVAILABLE FOR SALE.

MODEL	BODY
X	531434
Y	531433

NOT AVAILABLE FOR SALE



▲INCLUDED IN SEAL KIT 920084

■INCLUDED IN ADJUSTMENT SCREW KIT 942445

NOTE: FOR MODEL DGMFN-3-*-A*W-20 REVERSE PLUG 531497 AND FLOW CONTROL PARTS

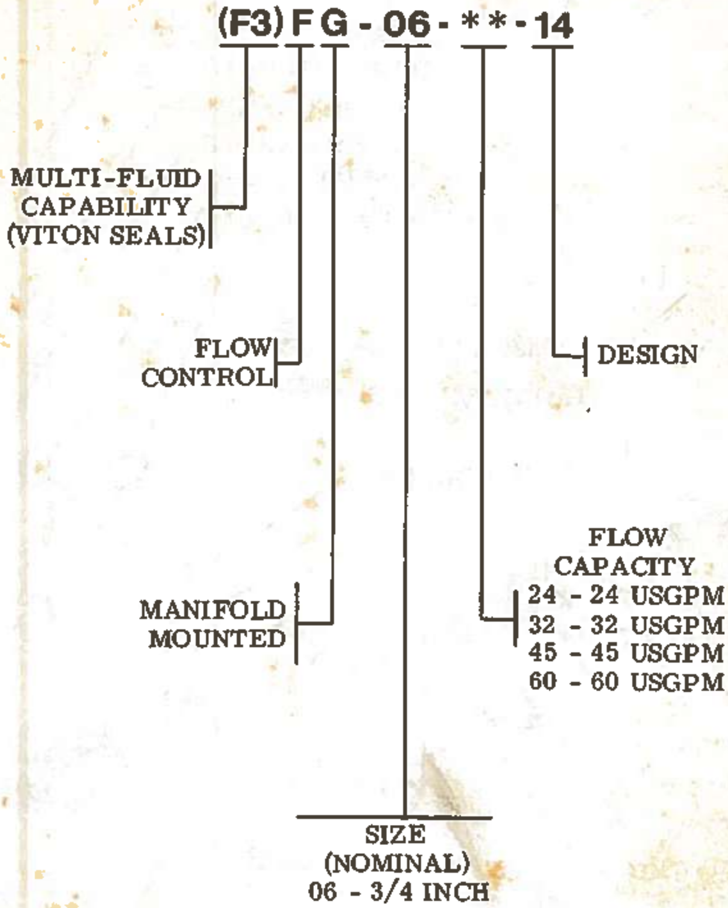
MODEL CODE BREAKDOWN

DGM FN - 3 - * - * 2 W - 20

- DGM — MODULAR VALVE
- FN — FLOW REGULATOR NON-COMPENSATED
- 3 — INTERFACE CETOP 3 (NFPA-D 01)
- * — DIRECTION OF FLOW
  - X - METER IN
  - Y - METER OUT
- * — PORT OPERATED UPON
  - A PORT
  - B PORT
- 2 — NEEDLE TYPE
  - 2 - COARSE
- W — ADJUSTMENT MECHANISM STANDARD SLOTTED SCREW AND LOCKNUT
- 20 — DESIGN

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

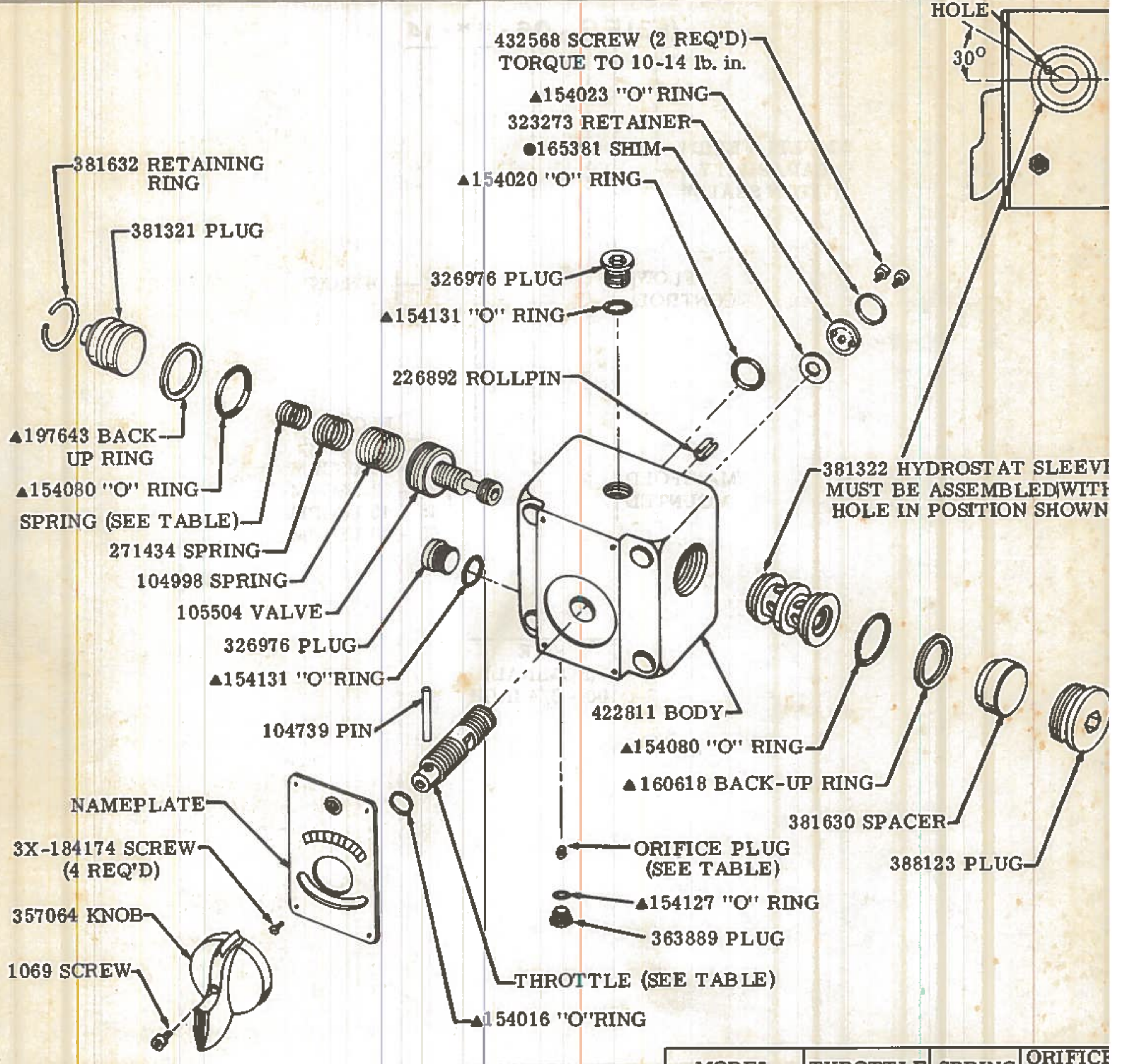
Litho in U. S. A.

Service Parts Information

VICKERS
A TRINOVA COMPANY

FLOW CONTROL VALVES

FG-06--14**



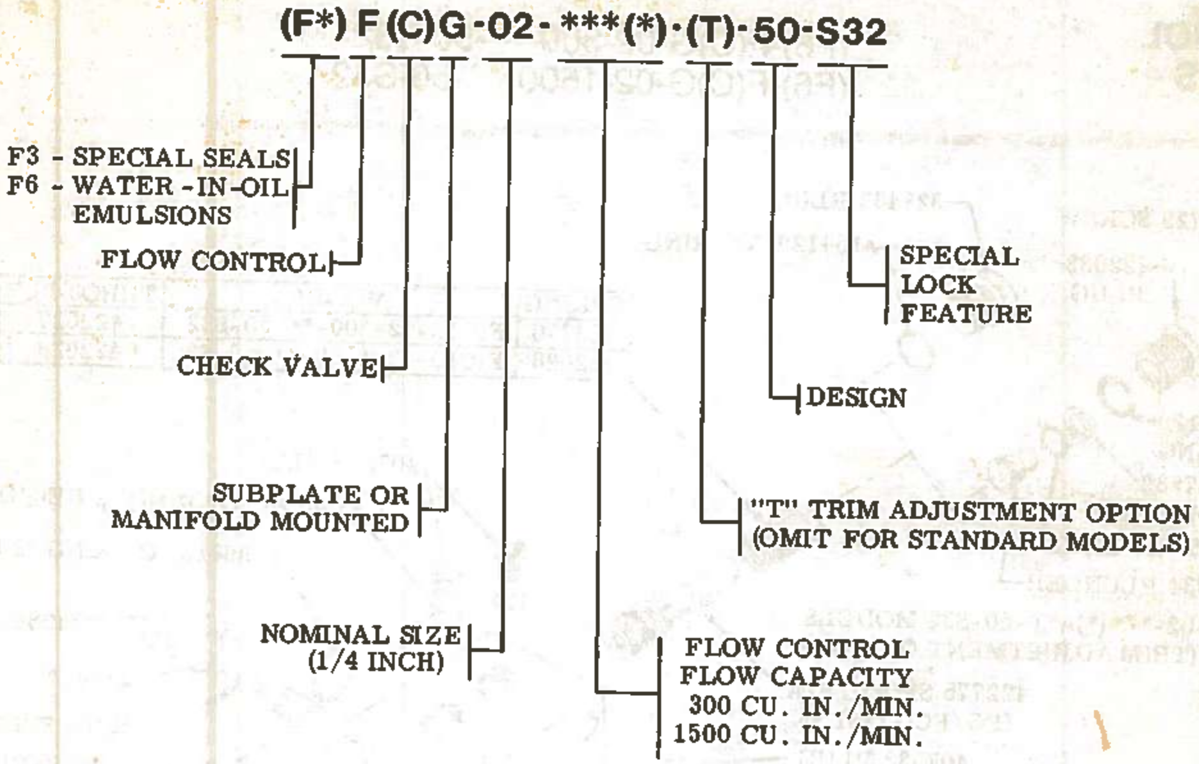
MODEL	THROTTLE	SPRING	ORIFICE PLUG
FG-06-24-14	133181	—	162976
FG-06-32-14	133182		
FG-06-45-14	133183		
FG-06-60-14	426851	387113	16794

▲INCLUDED IN 920212 SEAL KIT

F3 EQUIVALENT SEAL KIT 920217

●NOTE
ADD SHIMS AS REQUIRED TO PREVENT THROTTLE FROM LOCKING.

MODEL CODE BREAKDOWN



FLOW ADJUSTMENT PROCEDURE

WARNING

Before breaking a circuit connection, make certain that power is off and system pressure has been released. Lower all vertical cylinders, discharge accumulators, and block any load whose movement could generate pressure.

1. Remove the flow control from the machine or vehicle.

2. Separate the cover from the main body of the valve.

3. Attach the flow control to the machine without the cover. Use mounting bolt kit BKFG-02-640 to secure the valve during alignment. (The bolt kit consists of: four (4), 5/16-18, 2" long socket head screws SAE grade 7 or better.)

4. Loosen set screw in flange of throttle shaft and rotate shaft clockwise to increase flow or counterclockwise to decrease flow. When flow is set, tighten the set screw.

WARNING

Before removing the valve from the machine, remove power as shown above.

5. Remove the valve from the machine.

6. Place cover over the main body and assemble the valve to the machine or vehicle with the four screws provided with the valve.

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

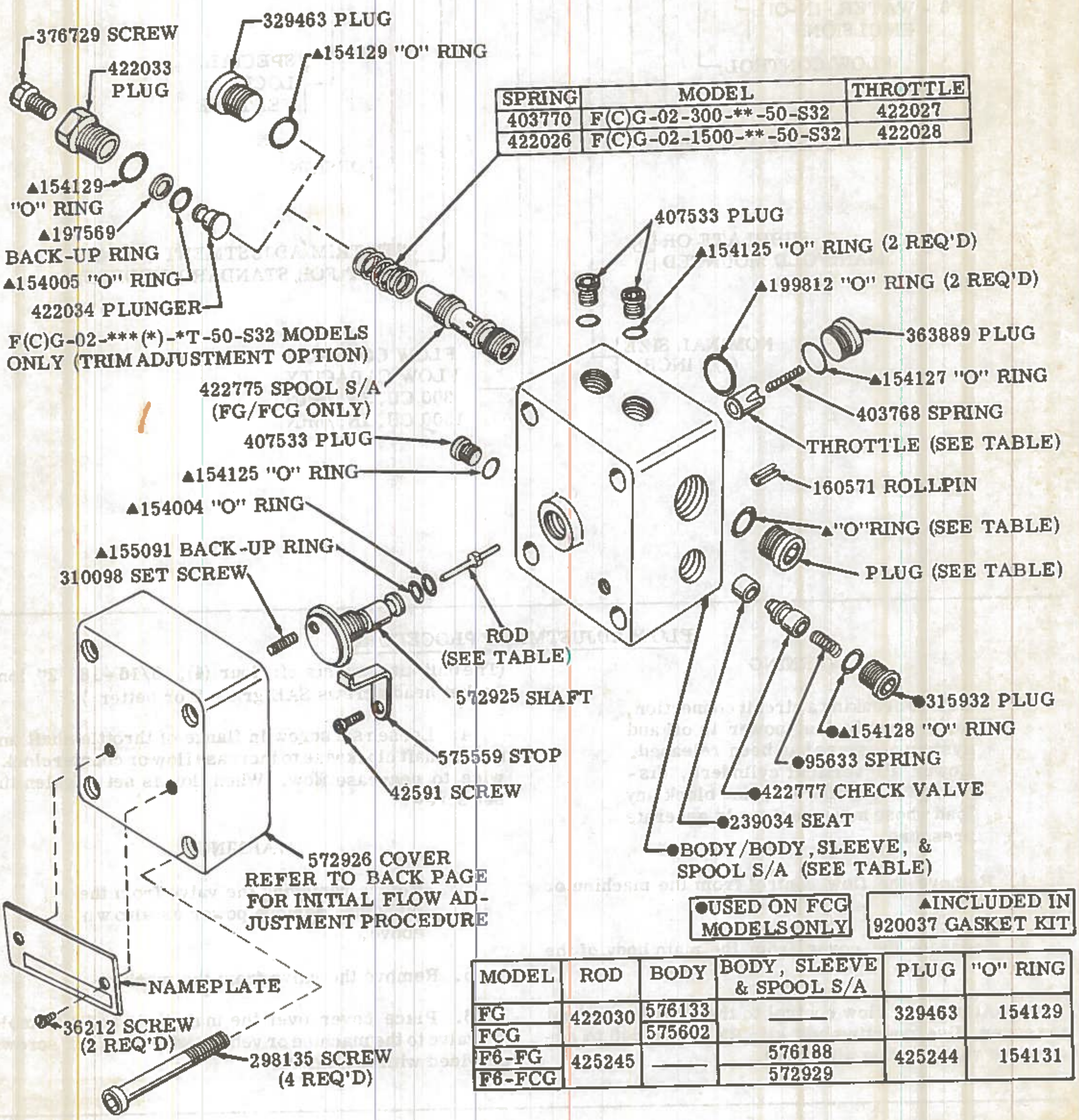
Litho in U.S.A.

Service Parts Information

VICKERS®
A TRINOVA COMPANY

FLOW CONTROL VALVES

(F6)-F(C)G-02-300-**-50-S32
(F6)-F(C)G-02-1500-**-50-S32



SPRING	MODEL	THROTTLE
403770	F(C)G-02-300-**-50-S32	422027
422026	F(C)G-02-1500-**-50-S32	422028

●USED ON FCG MODELS ONLY

▲INCLUDED IN 920037 GASKET KIT

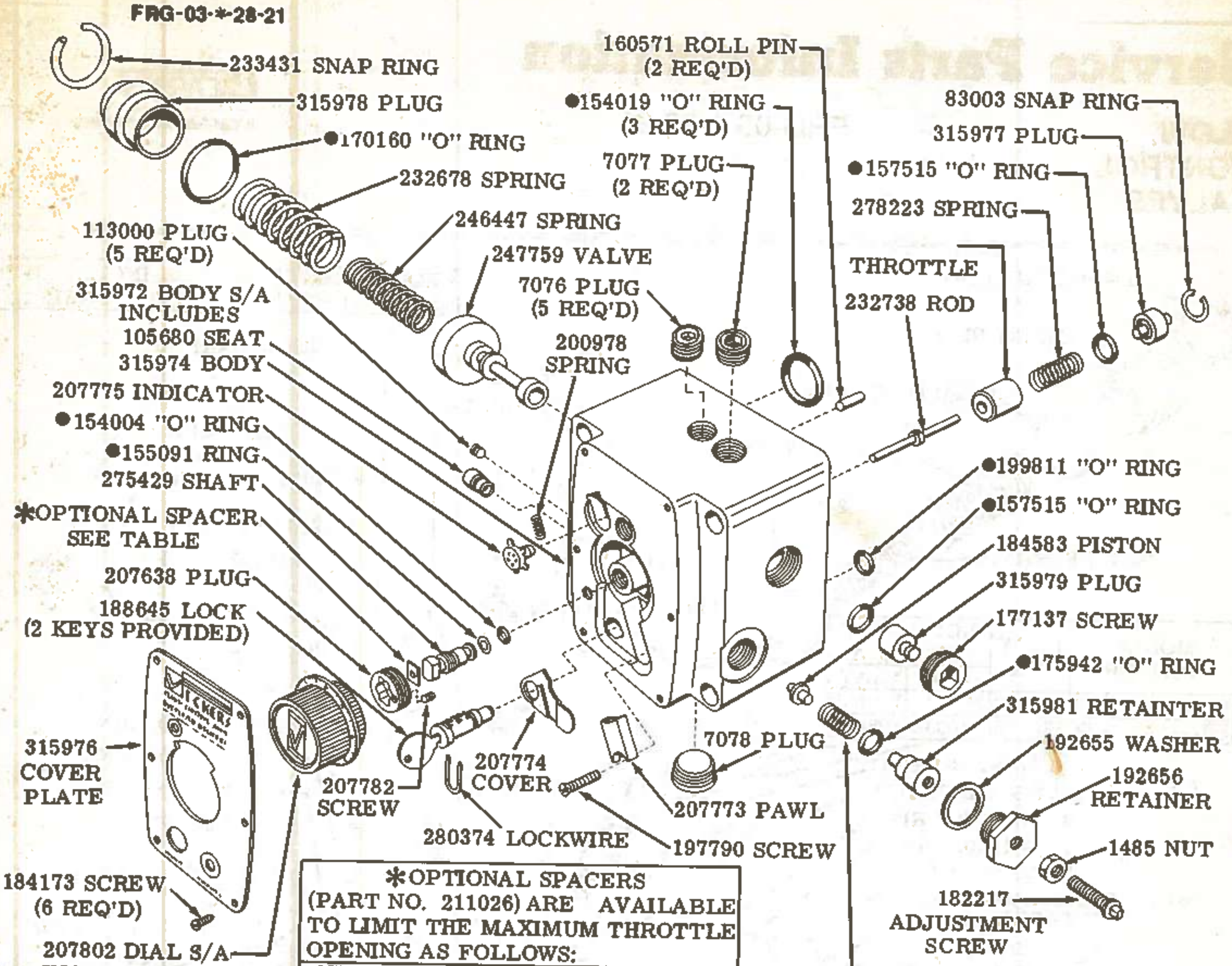
MODEL	ROD	BODY	BODY, SLEEVE & SPOOL S/A	PLUG	"O" RING
FG	422030	576133	—	329463	154129
FCG		575602			
F6-FG	425245	—	576188	425244	154131
F6-FCG			572929		

Revised 11-1-87

I-3407-S

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

FRG-03-*-28-21



●INCLUDED IN 919425 SEAL KIT

*OPTIONAL SPACERS (PART NO. 211026) ARE AVAILABLE TO LIMIT THE MAXIMUM THROTTLE OPENING AS FOLLOWS:

NUMBER OF SPACERS	LIMIT OF MAXIMUM VOLUME USGPM
3	4.5 TO 6
2	10 TO 13
1	18 TO 21

MODEL NUMBER	PRESSURE ADJUSTABLE TO PSI MAX.	SPRING
FRG-03-B-28-21	1000	175071
FRG-03-C-28-21	2000	175072
FRG-03-F-28-21	3000	175073

MODEL CODE BREAKDOWN

FR G-03-*-28-2*

- FLOW CONTROL — F
- RELIEF VALVE — R
- GASKET MOUNTED — G
- SERIES — 03
- MAXIMUM ADJUSTABLE PRESSURE — *
  - B- 1000 PSI
  - C- 2000 PSI
  - F- 3000 PSI
- MAXIMUM CAPACITY (USGPM) — 28
- DESIGN — 2*

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

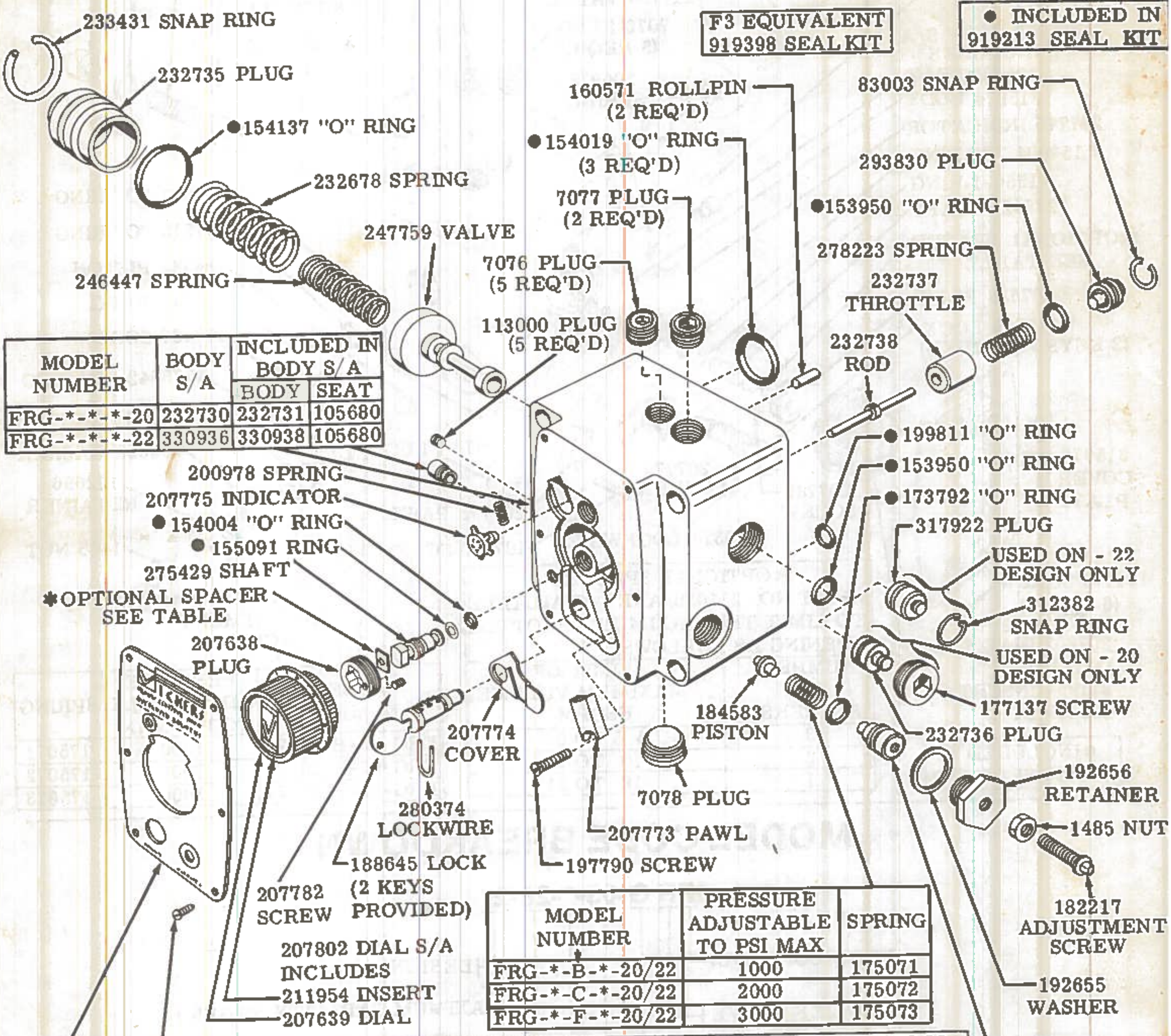
Litho in U.S.A.

Service Parts Information

FLOW CONTROL VALVES

FRG-03-*-28-2*

VICKERS® A TRINOVA COMPANY



MODEL NUMBER	BODY S/A	INCLUDED IN BODY S/A	
		BODY	SEAT
FRG-*-*-*-20	232730	232731	105680
FRG-*-*-*-22	330936	330938	105680

MODEL NUMBER	PRESSURE ADJUSTABLE TO PSI MAX	SPRING
FRG-*-B-*-20/22	1000	175071
FRG-*-C-*-20/22	2000	175072
FRG-*-F-*-20/22	3000	175073

COVER PLATE	SCREW (6 REQ'D)	MODEL NUMBER
232739	184173	FRG-*-*-*-20
315976	3X-117655	FRG-*-*-*-22

*OPTIONAL SPACERS (211026) ARE AVAILALBE TO LIMIT THE MAXIMUM THROTTLE OPENING AS FOLLOWS:

NUMBER OF SPACERS	LIMIT OF MAXIMUM VOLUME USGPM
3	4.5 TO 6
2	10 TO 13
1	18 TO 21

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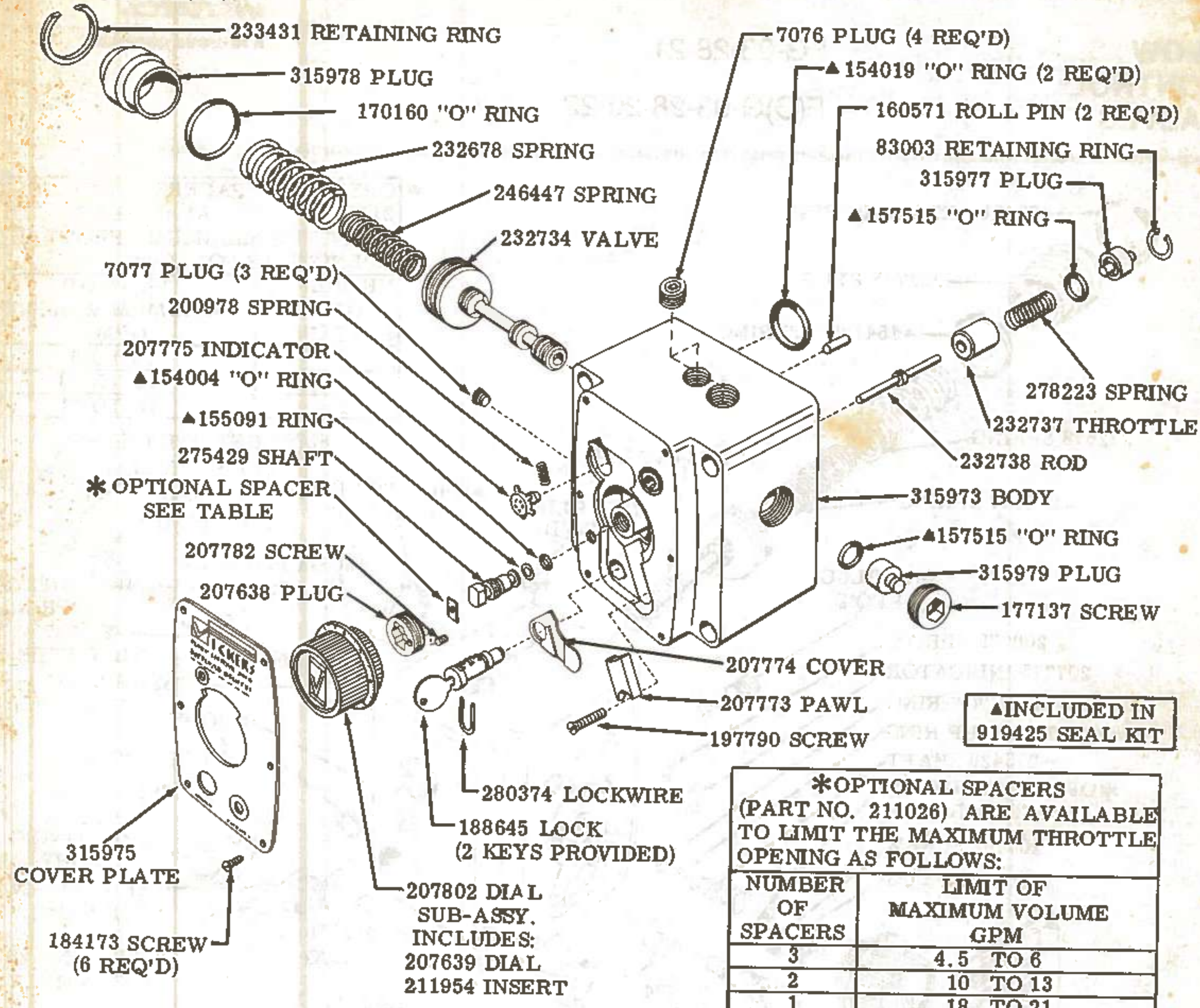
FG-03-28-21

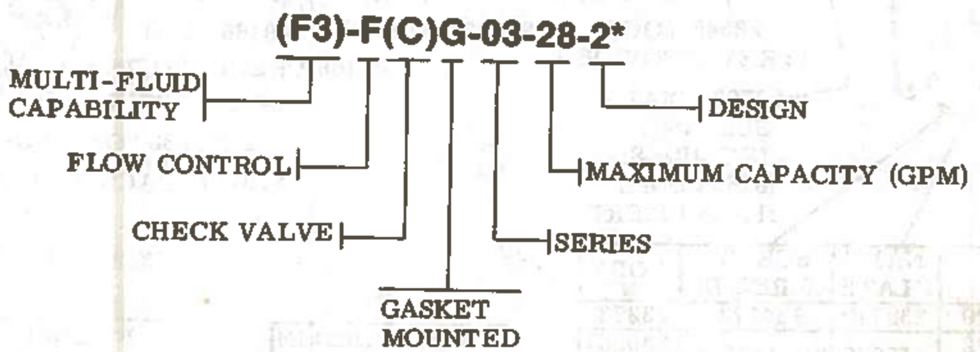


▲INCLUDED IN 919425 SEAL KIT

✱OPTIONAL SPACERS (PART NO. 211026) ARE AVAILABLE TO LIMIT THE MAXIMUM THROTTLE OPENING AS FOLLOWS:

NUMBER OF SPACERS	LIMIT OF MAXIMUM VOLUME GPM
3	4.5 TO 6
2	10 TO 13
1	18 TO 21

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

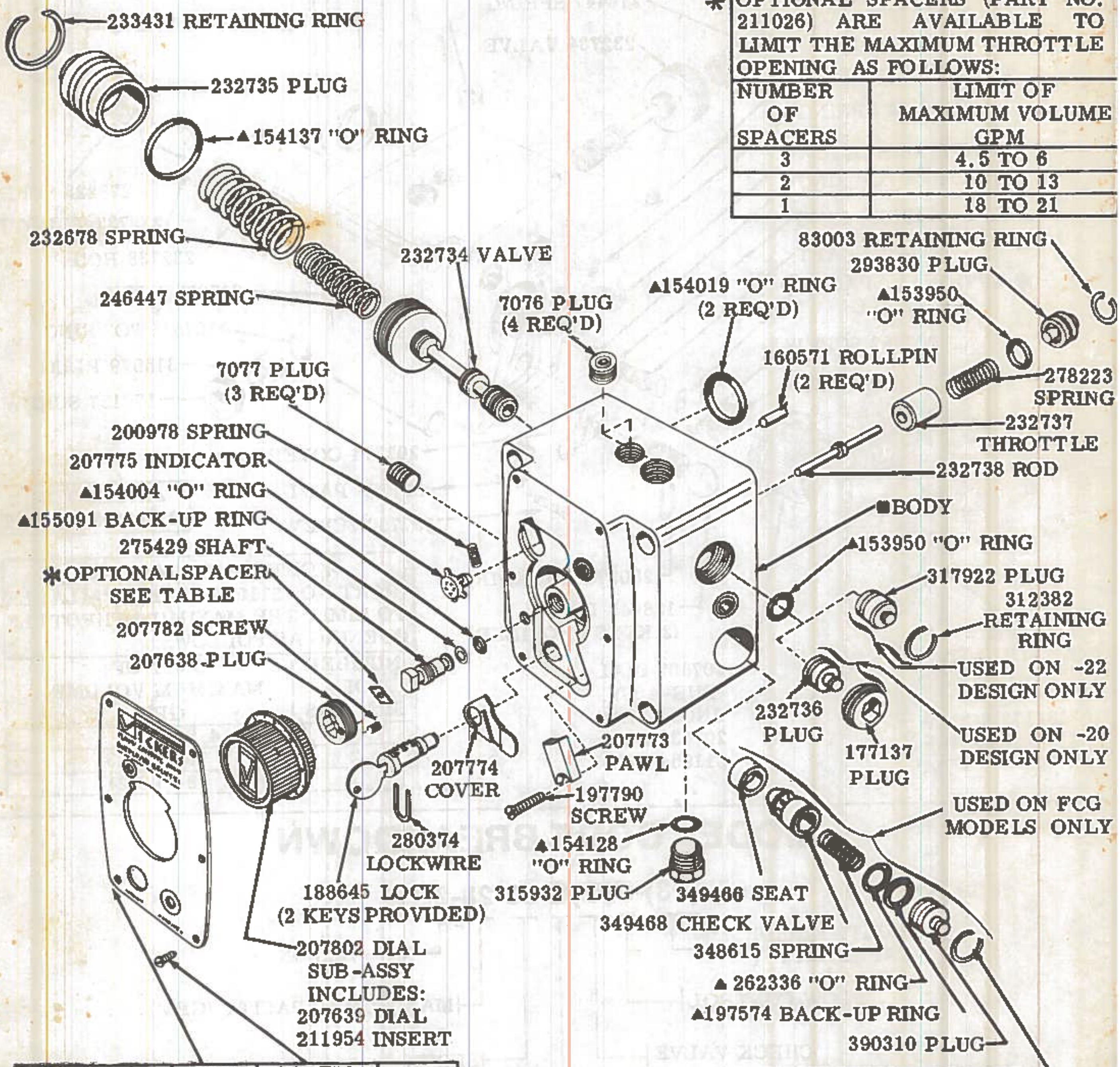
VICKERS
A TRINOVA COMPANY

FLOW CONTROL VALVES

FG-03-28-21

F(C)G-03-28-20/22

* OPTIONAL SPACERS (PART NO. 211026) ARE AVAILABLE TO LIMIT THE MAXIMUM THROTTLE OPENING AS FOLLOWS:	
NUMBER OF SPACERS	LIMIT OF MAXIMUM VOLUME GPM
3	4.5 TO 6
2	10 TO 13
1	18 TO 21

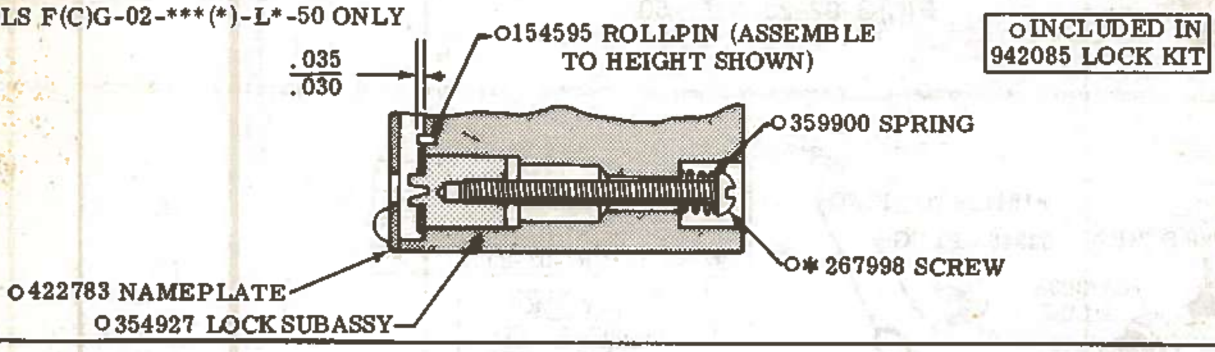


MODEL	NAME PLATE	SCREW (6 REQ'D)	BODY ■
FG-03-28-20	232740	184173	232732
FG-03-28-22	315975	3X-117655	330937
FCG-03-28-22			390309

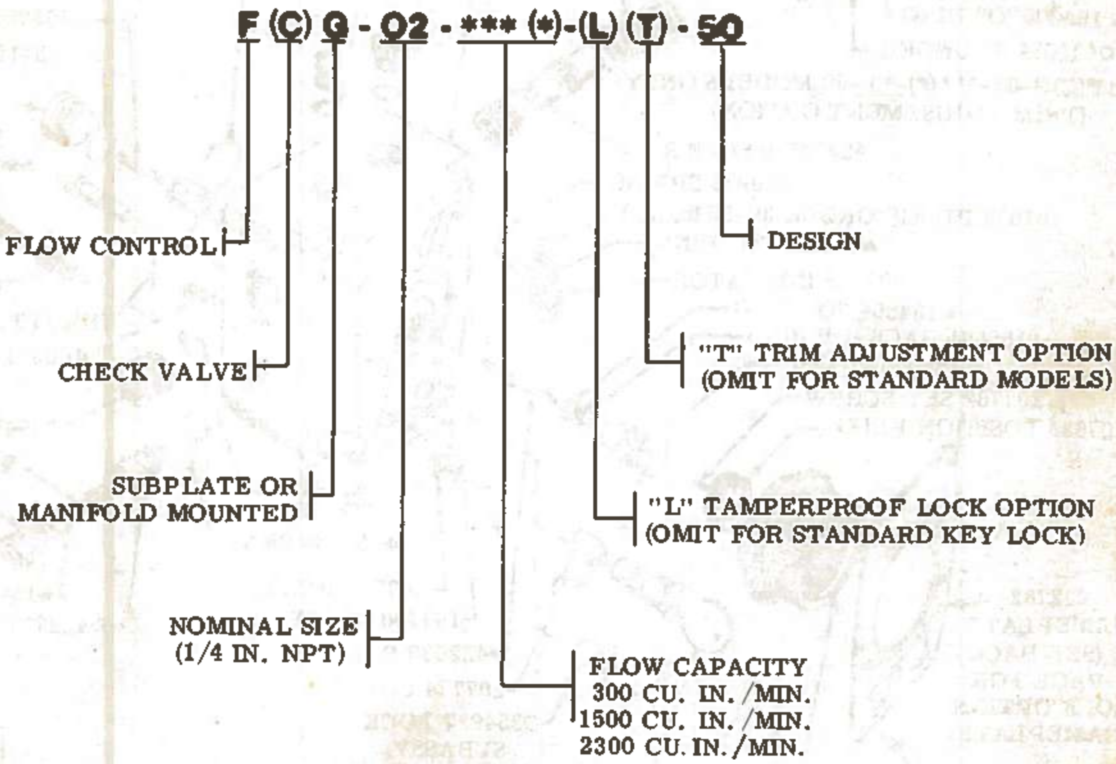
▲INCLUDED IN 919213 SEAL KIT

F3 EQUIVALENT 919398 SEAL KIT

TAMPERPROOF LOCK OPTION
MODELS F(C)G-02-***(*)-L*-50 ONLY



MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

Service Parts Information

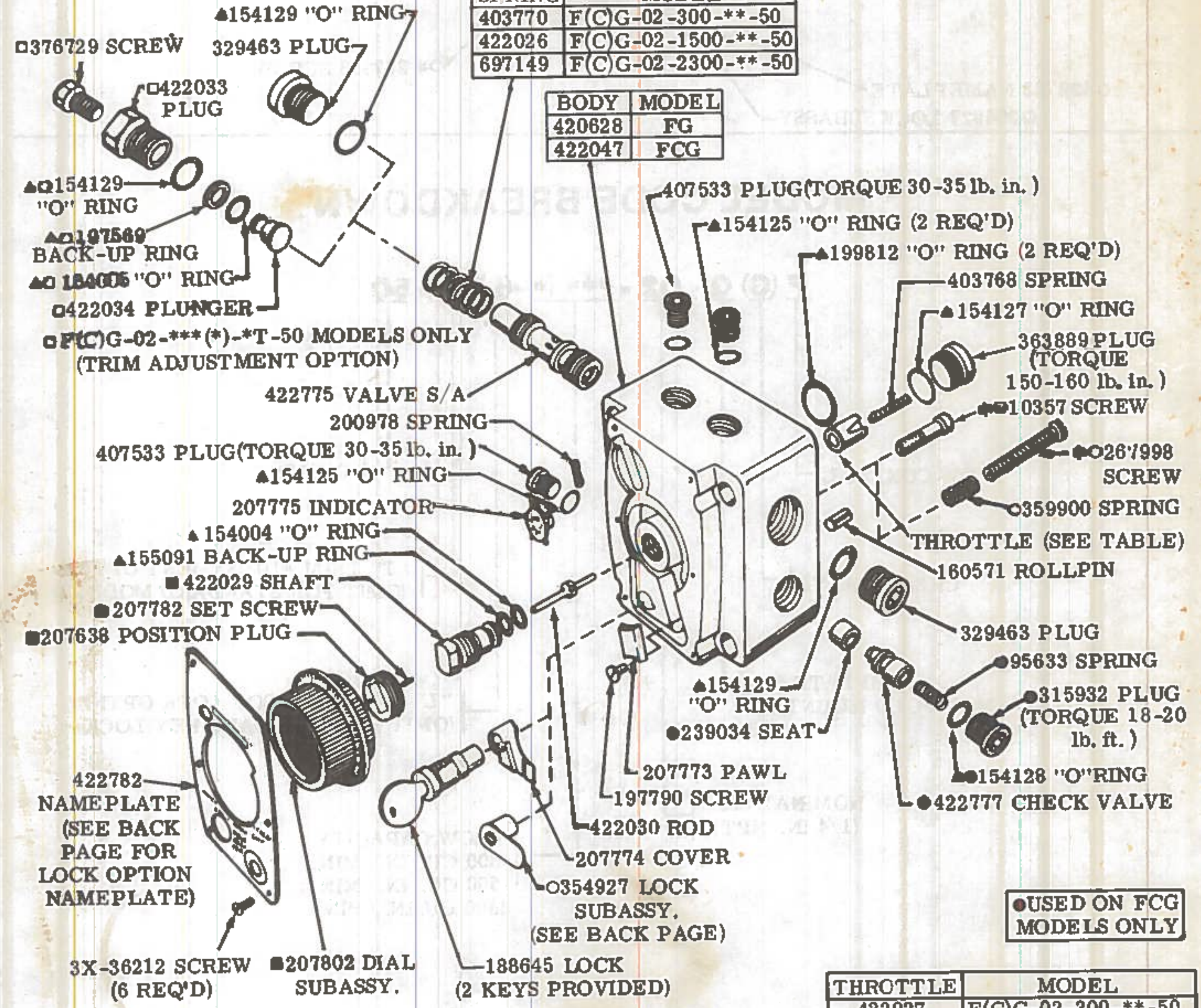
VICKERS®
A TRINOVA COMPANY

FLOW CONTROL VALVES

F(C)G-02-300-**-50
F(C)G-02-1500-**-50
F(C)G-02-2300-**-50

SPRING	MODEL
403770	F(C)G-02-300-**-50
422026	F(C)G-02-1500-**-50
697149	F(C)G-02-2300-**-50

BODY	MODEL
420628	FG
422047	FCG



●USED ON FCG MODELS ONLY

THROTTLE	MODEL
422027	F(C)G-02-300-**-50
422028	F(C)G-02-1500-**-50
853593	F(C)G-02-2300-**-50

■WITH 422029 CONTROL SHAFT SCREWED FULLY IN, ADJUST 207638 POSITIONING PLUG IN 207802 DIAL SO THAT "O" ON DIAL LINES UP WITH POINTER ON NAMEPLATE WHEN DIAL IS ASSEMBLED ON SHAFT. LOCK SECURELY WITH 207782 SET SCREW.

▲INCLUDED IN 920037 SEAL KIT

F3 EQUIVALENT SEAL KIT 920103

* COAT THREADS WITH LOCTITE SEALANT. TIGHTEN TO LOCKING POSITION THEN BACK OFF 1/4 TURN.

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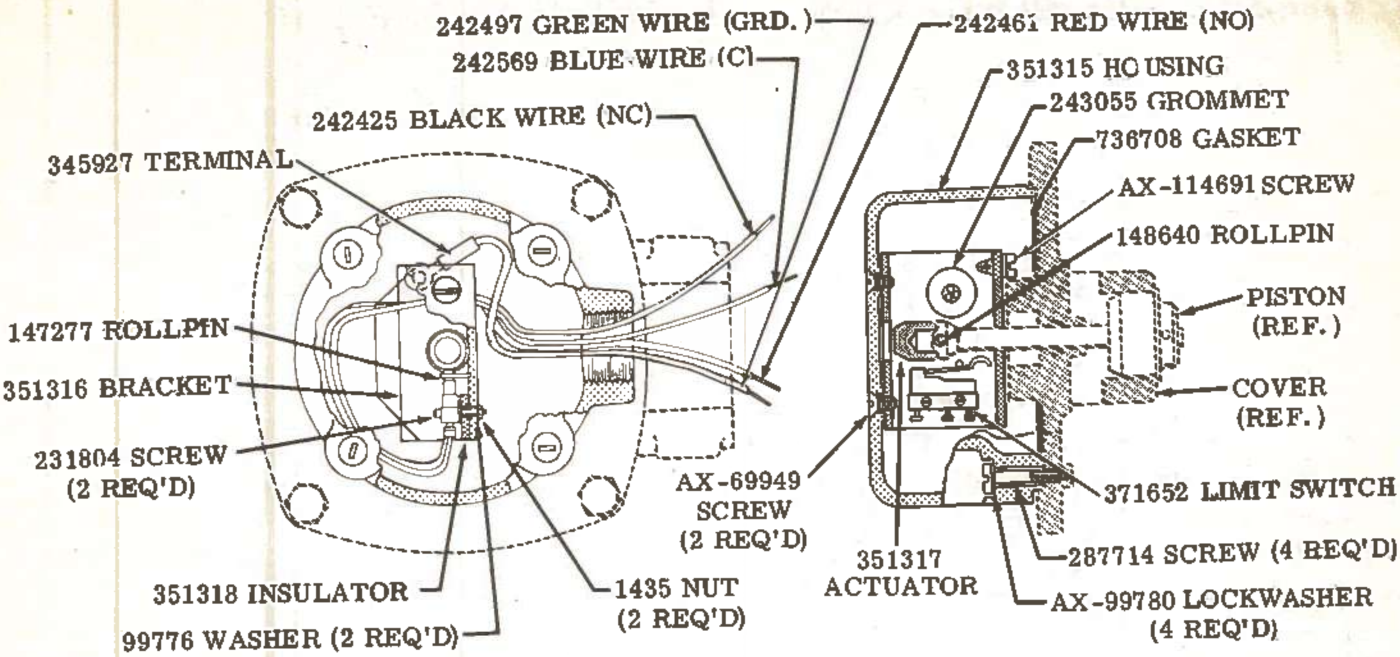
ELECTRICAL INDICATOR COMPONENTS (ALL MODELS)



(STD/F3/F6 ELECTRICAL INDICATOR PARTS AVAILABLE IN KIT 942399)

MODEL CODE BREAKDOWN

(F*) - ** F * - * * - * - * - * - 1*

FLUID COMPATIBILITY PREFIX
F3 - MINERAL OIL & FIRE RESISTANT FLUIDS
F6 - SOLUBLE OIL
OMITTED FOR PETROLEUM OIL

PACKAGE SIZE
10
50
100

INLET FILTER WITH AIR BLEED

FLOW RATINGS

10	50	100
A-12 GPM	B-28 GPM	E-104 GPM
	C-47 GPM	F-140 GPM
	D-67 GPM	

FILTER ELEMENT MICRON RATING
"1" - 100 MESH (149 MICRON)
"2" - 200 MESH (74 MICRON)

PORT CONNECTIONS
P - NPTF THREAD
S - SAE STRAIGHT THD.
F - SAE FLANGE
PF - NPTF THREAD (INLET) SAE FLANGE OUTLET
SF - SAE STRAIGHT THD. (INLET) SAE FLANGE (OUTLET)
B - BSPF THREAD

E - ELECTRICAL INDICATOR
L - LESS INDICATOR
(OMIT FOR MECHANICAL INDICATOR)

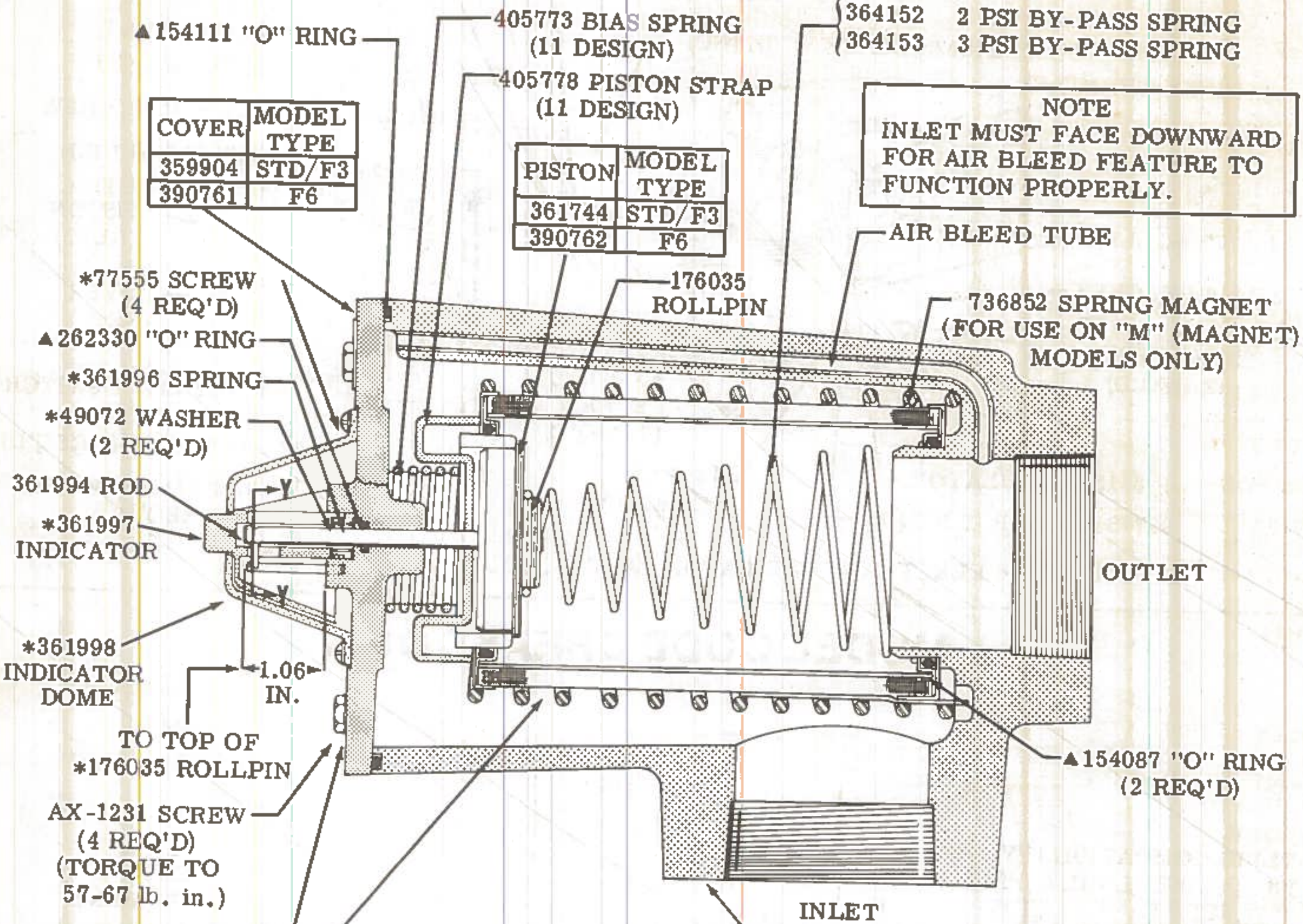
3 - BY-PASS SPRING 3 PSI
(OMITTED FOR 2 PSI SPRINGS)

M - MAGNET
(OMIT IF NOT REQ'D)

DESIGN
10 - FIRST DESIGN
11 - MISSING ELEMENT INDICATOR

(F*)-50F*-**-*-*-*-10/11
28,47,&67 GPM INLET FILTER

*INCLUDED IN MECHANICAL INDICATOR KIT 942477



COVER	MODEL TYPE
359904	STD/F3
390761	F6

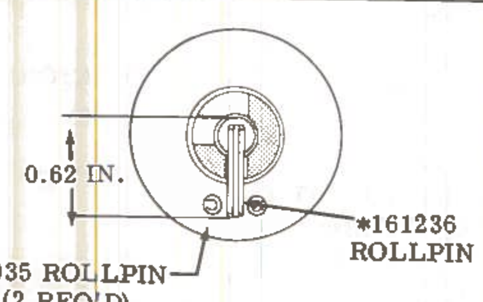
PISTON	MODEL TYPE
361744	STD/F3
390762	F6

NOTE
INLET MUST FACE DOWNWARD FOR AIR BLEED FEATURE TO FUNCTION PROPERLY.

STD/F3 FILTER ELEMENT KITS			
MODEL	ELEMENT	STD.	F3
50FB-1*-*-10/11	361991	941056	941057
50FB-2*-*-10/11	361740	941058	941059
50FC/D-1*-*-10/11	361992	941060	941061
50FC/D-2*-*-10/11	361741	941062	941063

HOUSING TYPE		1-1/2 INCH (28 USGPM)	2 INCH (47 USGPM)	2-1/2 INCH (67 USGPM)
"P"	STD/F3	361750	361751	367137
	F6	390753	390754	390755
"S"	STD/F3	367128	367129	——
	F6	390756	390757	
"F"	STD/F3	367131	367132	367138
	F6	390758	390759	390760
"PF"	STD/F3	573006	573007	573008
	F6	573023	573024	573025
"SF"	STD/F3	573010	573011	——
	F6	573026	573027	

NOTE - HOUSING TYPES "S" AND "F" CONFORM TO SAE STANDARDS



ENLARGED SECTION Y-Y

POSITION ROLLPIN SLOTS AS SHOWN.

▲INCLUDED IN 919643 SEAL KIT FOR STD & F6.

F3 EQUIVALENT 919644 SEAL KIT

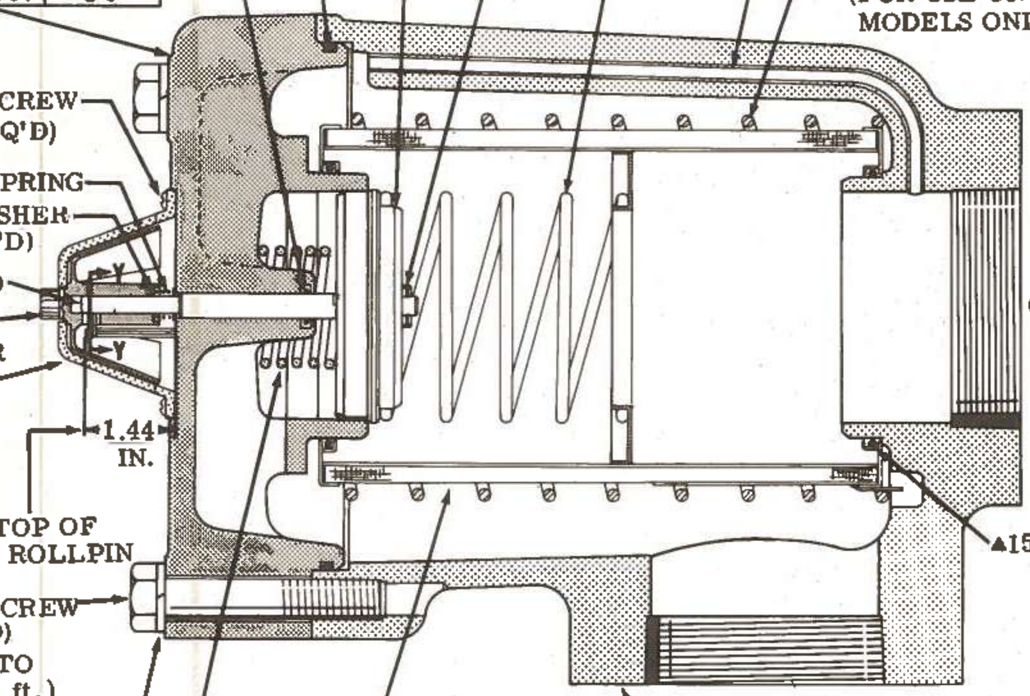
(F*)-100F*-**-*-*-*-10/11

104 & 140 GPM INLET FILTERS

COVER	MODEL TYPE
378795	STD/F3
390767	F6

PISTON	MODEL TYPE
378794	STD/F3
390768	F6

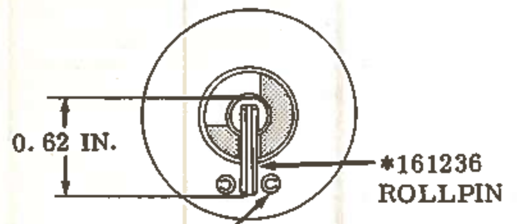
NOTE
INLET MUST FACE DOWNWARD FOR AIR BLEED FEATURE TO FUNCTION PROPERLY.



STD/F3 FILTER ELEMENT KITS			
MODEL	ELEMENT	STD.	F3
100FE/F-1*-*-10/11	378991	941064	941065
100FE/F-2*-*-10/11	378990	941066	941067

HOUSING TYPE		3 INCH (104 USGPM)	3-1/2 INCH (140 USGPM)
"P"	STD/F3	378998	378999
	F6	390763	390764
"F"	STD/F3	378995	378996
	F6	390765	390766
"PF"	STD/F3	573013	573014
	F6	573028	573029

NOTE - HOUSING TYPE "F" CONFORMS TO SAE STANDARDS



ENLARGED SECTION Y-Y

POSITION ROLLPIN SLOTS AS SHOWN

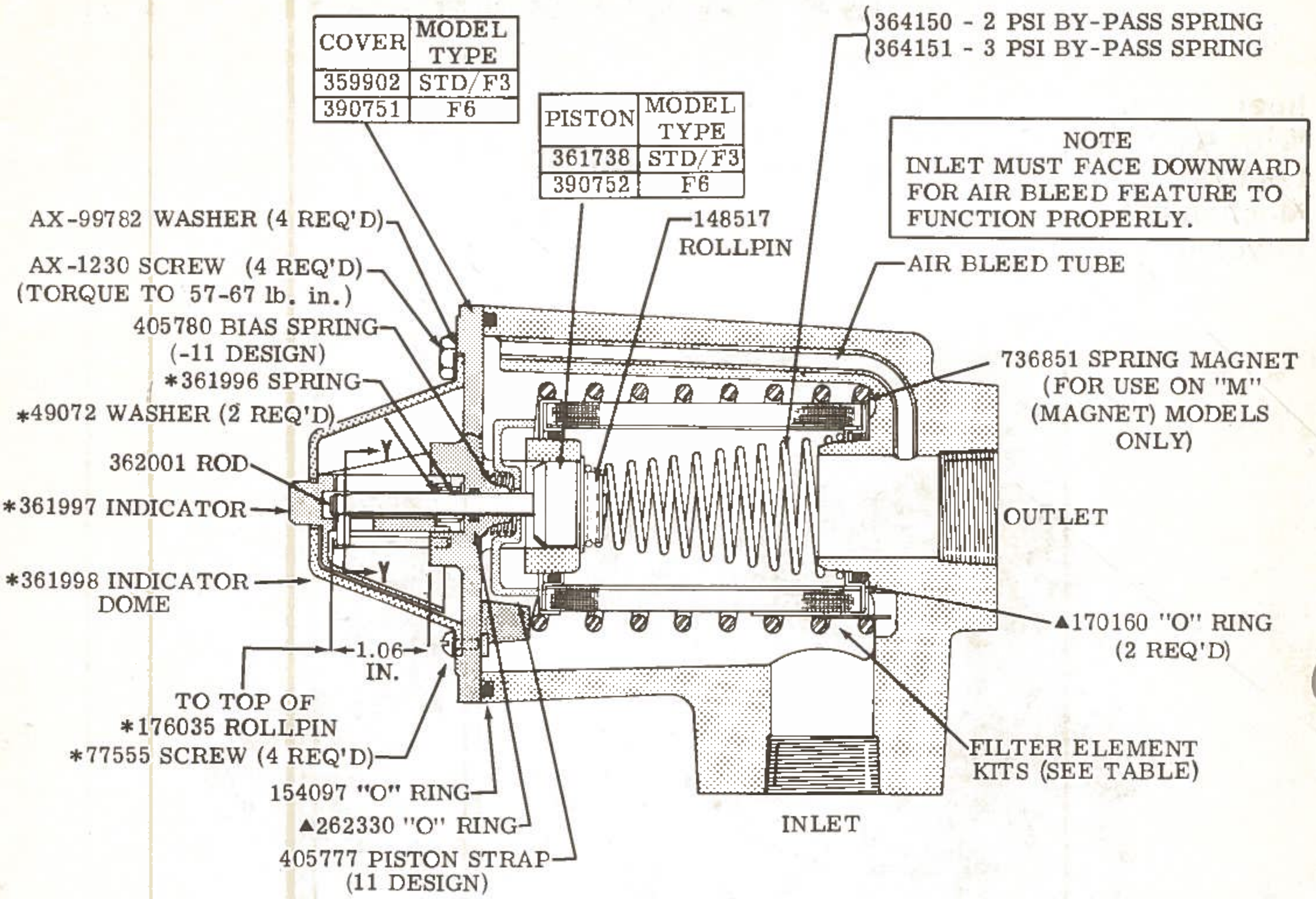
*INCLUDED IN MECHANICAL INDICATOR KIT 942477

▲INCLUDED IN 919740 SEAL KIT FOR STD & F6.

F3 EQUIVALENT 919741 SEAL KIT

(F*)-10FA-**-*-*-*-10/11
12 GPM INLET FILTER

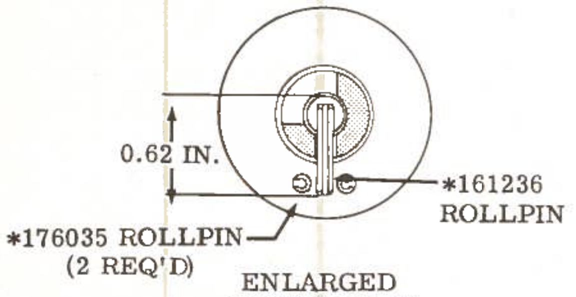
*INCLUDED IN MECHANICAL INDICATOR KIT 942477



COVER	MODEL TYPE
359902	STD/F3
390751	F6

PISTON	MODEL TYPE
361738	STD/F3
390752	F6

HOUSING TYPE	"P" 1 INCH NPTF THD.	"S" - 1 INCH OD TUBE SAE STR. THD.	"F" - 1 INCH PIPE, SAE FLANGE	"PF" INLET - Same as "P" OUTLET - Same as "F"	"SF" INLET - Same as "S" OUTLET - Same as "F"	"B" - G1 (BSPF) THREAD
STD/F3	359906	362000	367126	573003	573004	575965
F6	390748	390749	390750	573021	573022	575966



ENLARGED SECTION Y-Y

POSITION ROLL PIN SLOTS AS SHOWN.

STD/F3 FILTER ELEMENT KITS			
MODEL	ELEMENT	STD.	F3
10FA-1*-*-10/11	361990	941052	941053
10FA-2*-*-10/11	361739	941054	941055

▲INCLUDED IN 919641 SEAL KIT FOR STD & F6.

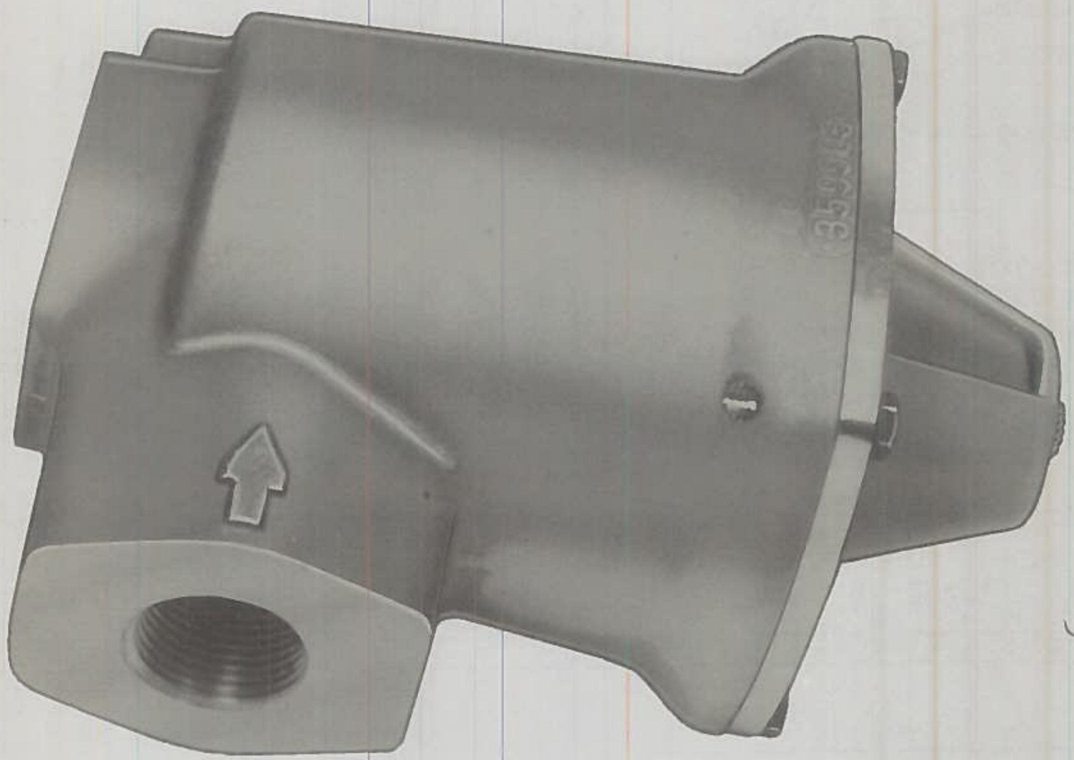
F3 EQUIVALENT 919642 SEAL KIT

VICKERS

Service Parts Information

Inlet Filters With Air Bleed Feature Mechanical Indicator

(F*)-10FA-**-*-*-*-10/11
(F*)-50F*-**-*-*-*-10/11
(F*)-100F*-**-*-*-*-10/11



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Revised 7-1-86

I-3951-S

Service Parts Information

VICKERS
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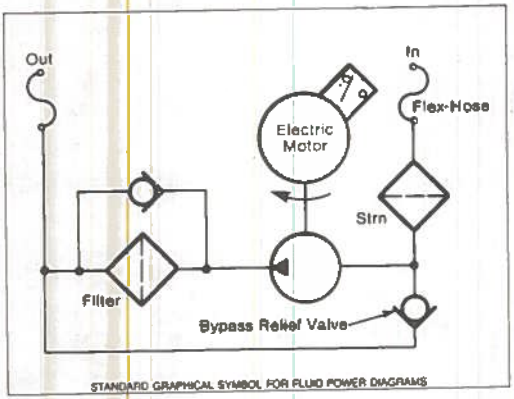
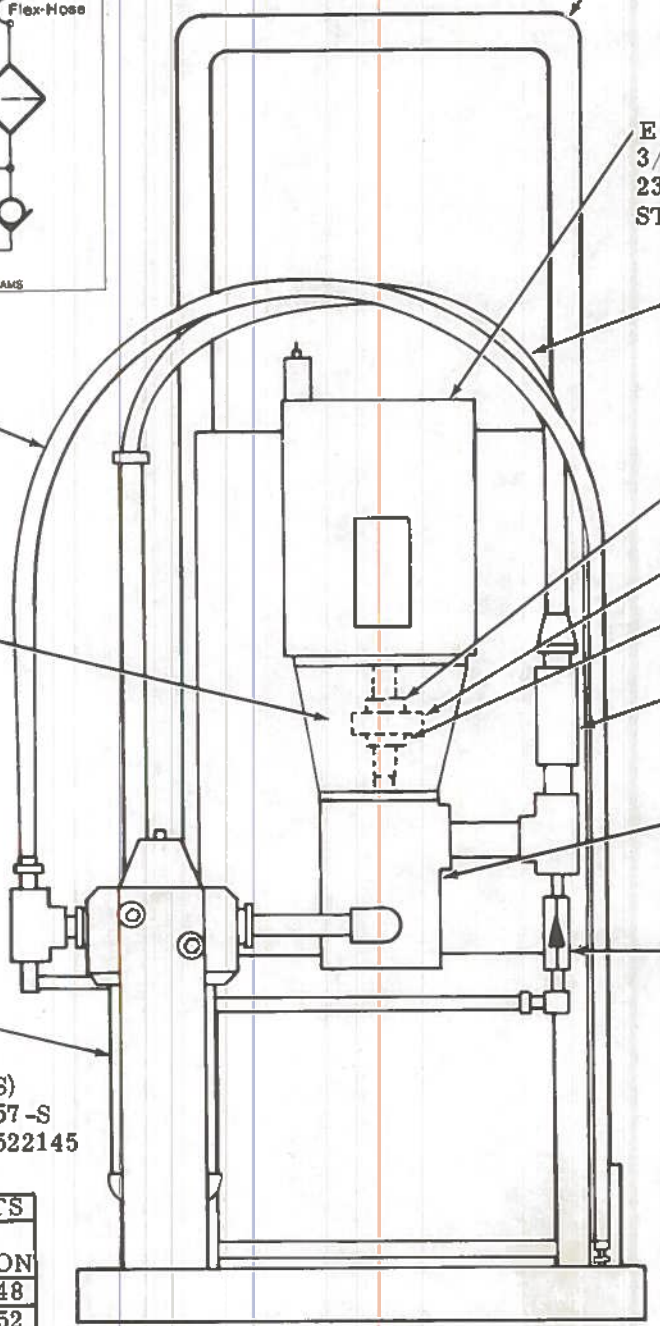
PORTA FILTER & TRANSFER UNIT

(F3)PFTU-OFR30

PFTU-OFRS60





MODEL	ELEMENT KITS	
	3 MICRON	10 MICRON
OFR30	941446	941448
F3-OFR30	941450	941452
OFRS60	941190	941107

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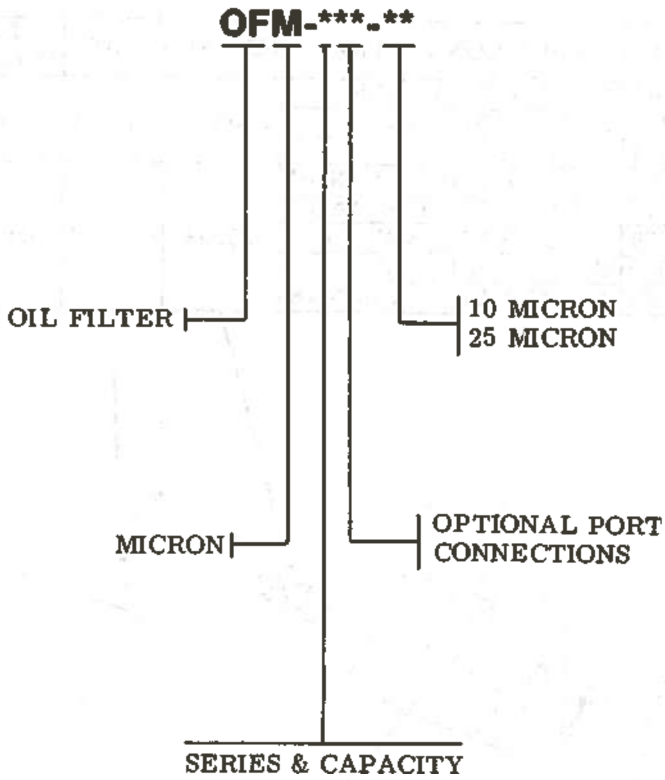
MODEL CODE BREAKDOWN



OFM FILTERS, IN THEIR STANDARD FORM, ARE APPROVED FOR USE WITH WATER-GLYCOL, PHOSPHATE ESTER AND CHLORINATED HYDROCARBON FIRE-RESISTANT FLUIDS. THEY ARE NOT RECOMMENDED FOR USE WITH WATER AND OIL EMULSIONS.

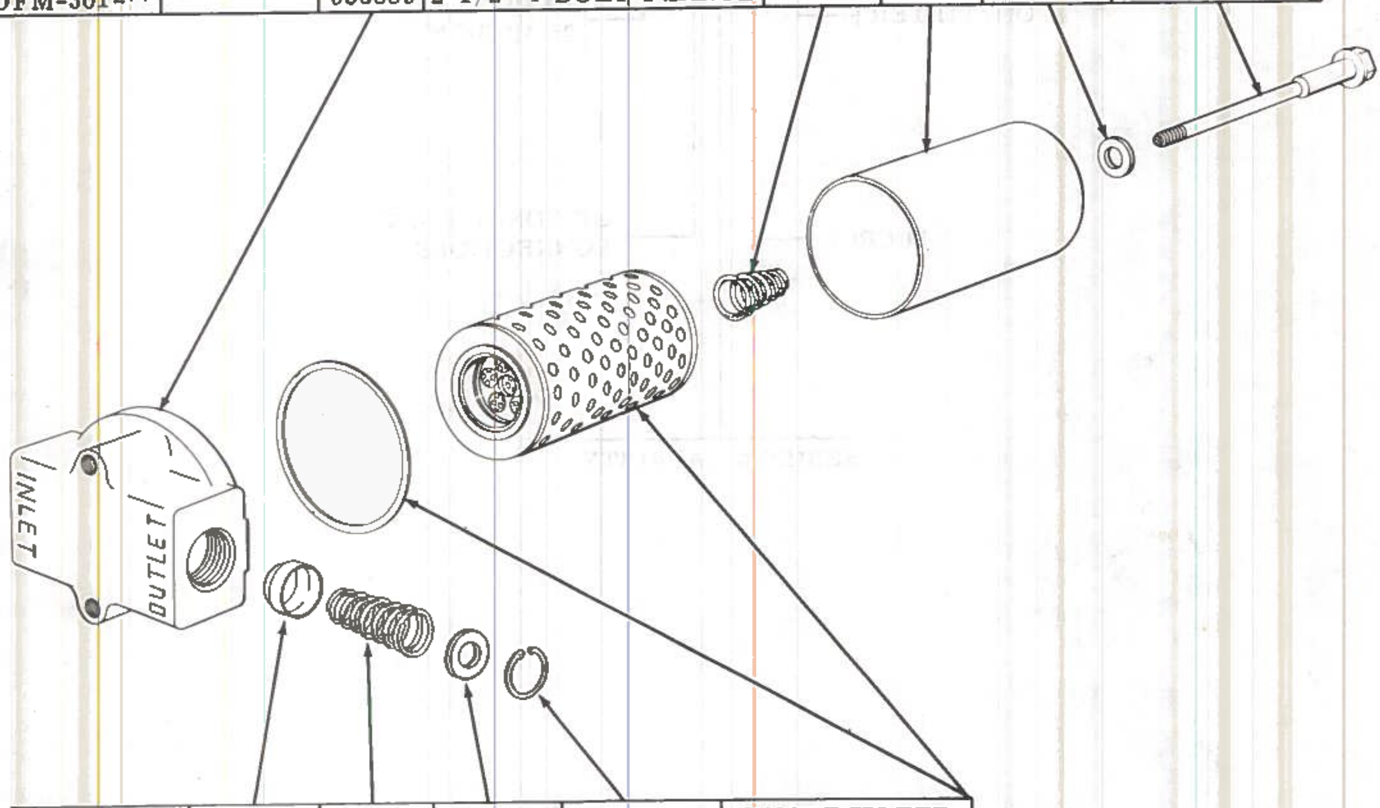
Service Parts Information

LOW PRESSURE RETURN LINE FILTERS

OFM Series -100, -200 & -300

VICKERS®
A TRINOVA COMPANY

MODEL	CAPACITY (GPM)	BASE	PORT CONNECTION	SPRING	BODY	SEAL WASHER	BOLT
OFM-100-**	0-50	936965	1" 4-BOLT FLANGE	936955	263231	936949	936947 TORQUE TO 12-15 LB. FT.
OFM-101-**		936967	1" PIPE THREAD				
OFM-102-**		936974	1" TUBE				
OFM-200-**	0-125	936975	1-1/4" 4-BOLT FLANGE	936958	936954	936950	936948 TORQUE TO 30-35 LB. FT.
OFM-201-**		936977	1-1/2" 4-BOLT FLANGE				
OFM-202-**		936978	1-1/2" PIPE THREAD				
OFM-300-**	100-300	936980	2" 4-BOLT FLANGE				
OFM-301-**		936889	2-1/2" 4-BOLT FLANGE				



MODEL	POPPET	VALVE SPRING	WASHER	RET. RING	SINGLE FILTER ELEMENT KIT (INCLUDES SEAL)
OFM-1**-10	936944	936941	938375	87764	923069
OFM-1**-25		939000			922788
OFM-2**-10	936945	936942	938376	87885	923070
OFM-2**-25		939001			922789
OFM-3**-10	936946	936943	936854	103824	923070
OFM-3**-25		939002			922789

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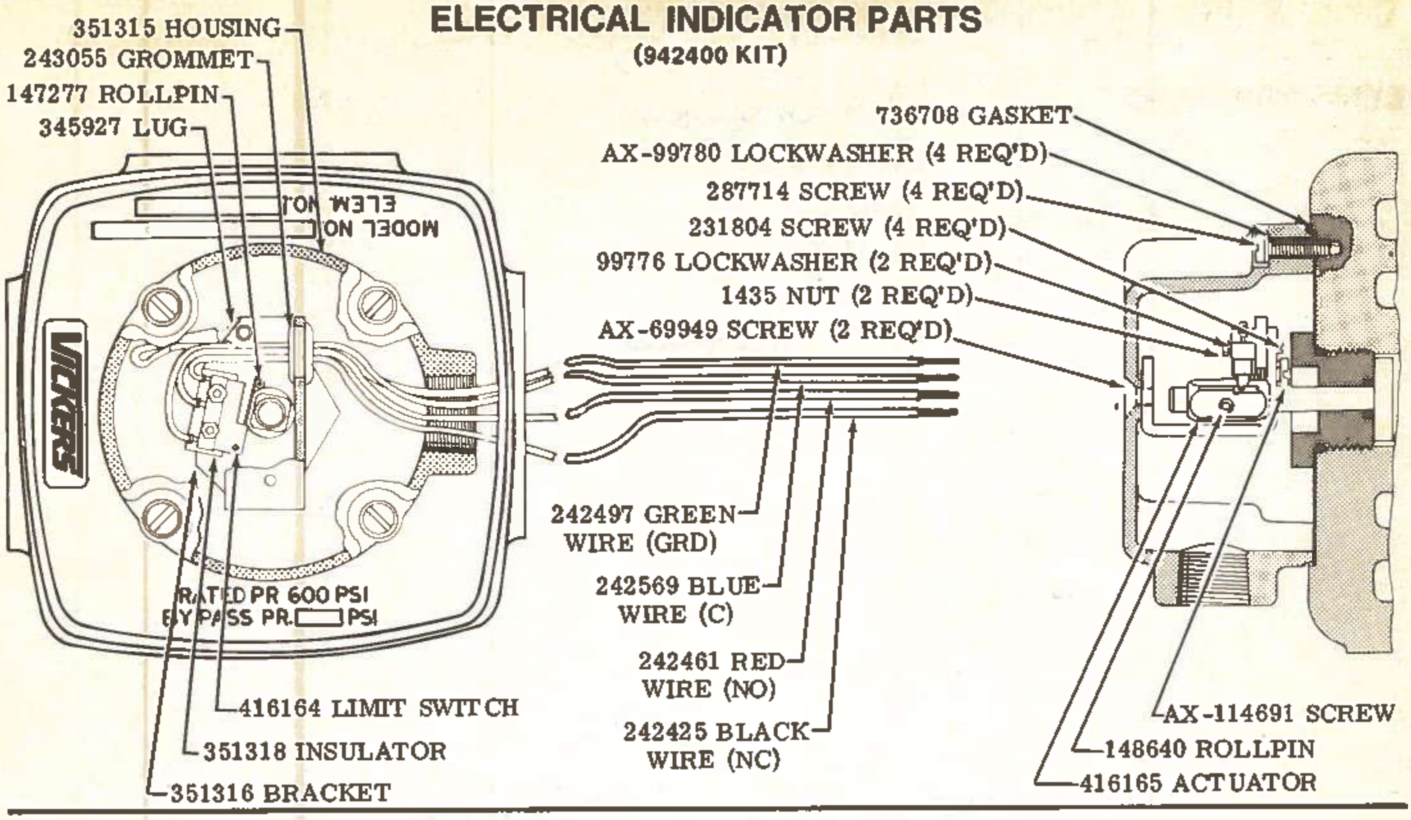
ELECTRICAL INDICATOR PARTS

(942400 KIT)



MODEL CODE BREAKDOWN

(F3)-OFR-*-*-*-*-*-10

(F3) — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS

OFR — OIL FILTER RETURN LINE

* — FLOW RATING - USGPM
- 15 USGPM - OFR-15
- 30 USGPM - OFR-30
- 60 USGPM - OFR-60
- 120 USGPM - OFR-120

* — PORT CONNECTIONS
- B - G1 (BSPF) THREADS (15 & 30 USGPM ONLY)
- F - SAE FLANGE
- P - NPTF THREAD
- S - SAE STR. THREAD

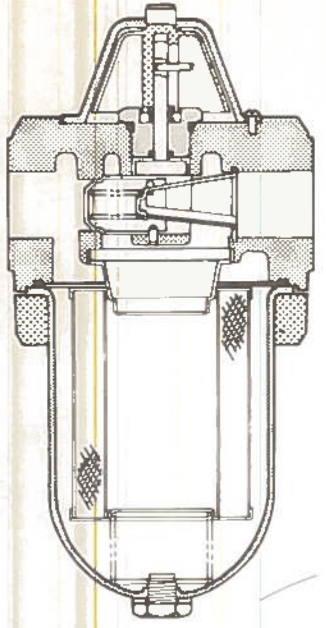
* — NOMINAL FILTRATION
- 3M - 3 MICROMETRE
- 7G - 7 MICROMETRE (GLASS MEDIA)
- 7M - 7 MICROMETRE
- BLANK - 10 MICROMETRE

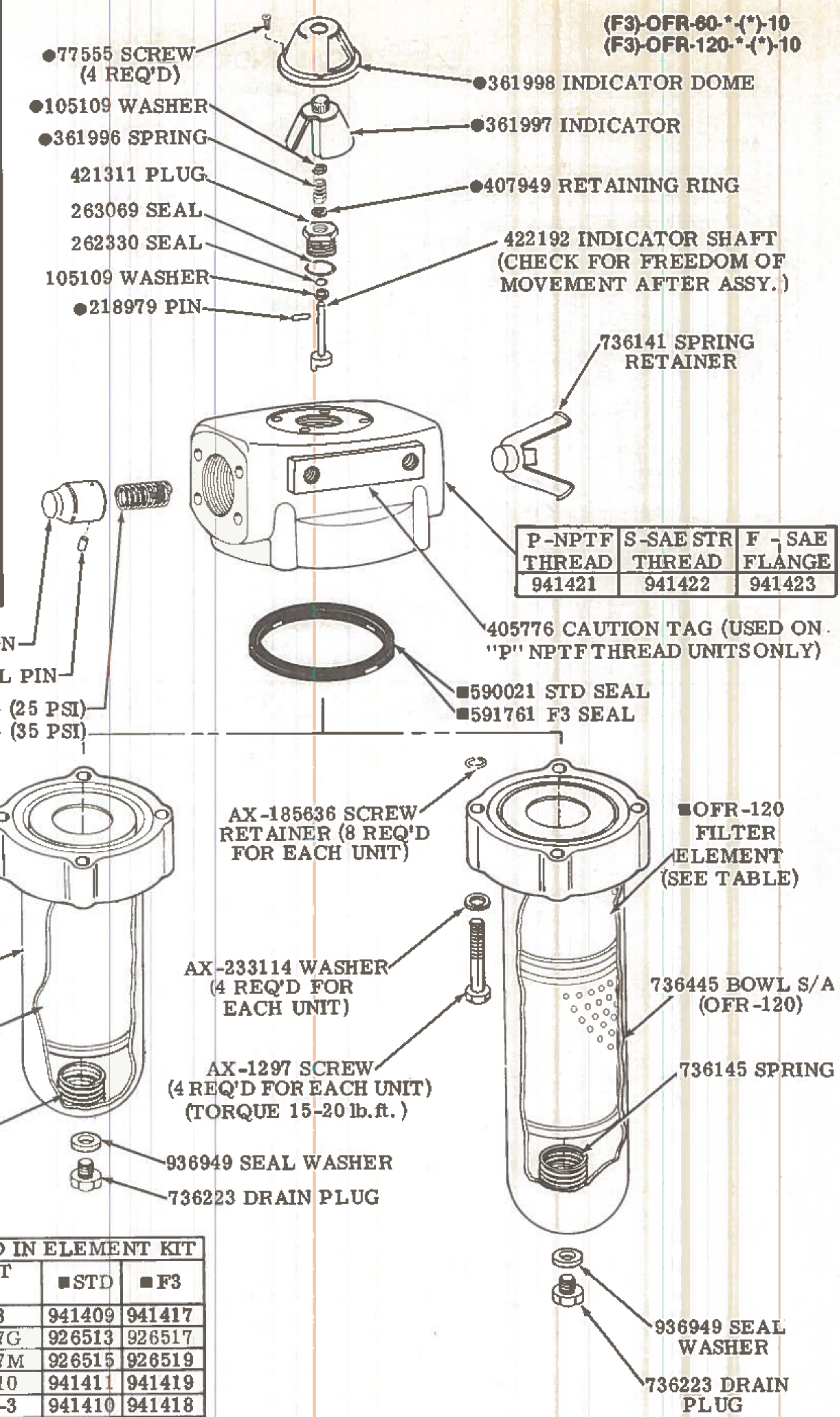
* — INDICATOR TYPE
- E - ELECTRICAL INDICATOR
- L - LESS INDICATOR
- BLANK - MECHANICAL INDICATOR

* — BY-PASS PRESSURE SETTING
- BLANK - 25 PSI
- 35 - 35 PSI

10 — DESIGN

(F3)-OFR-60-*-(*)-10
(F3)-OFR-120-*-(*)-10





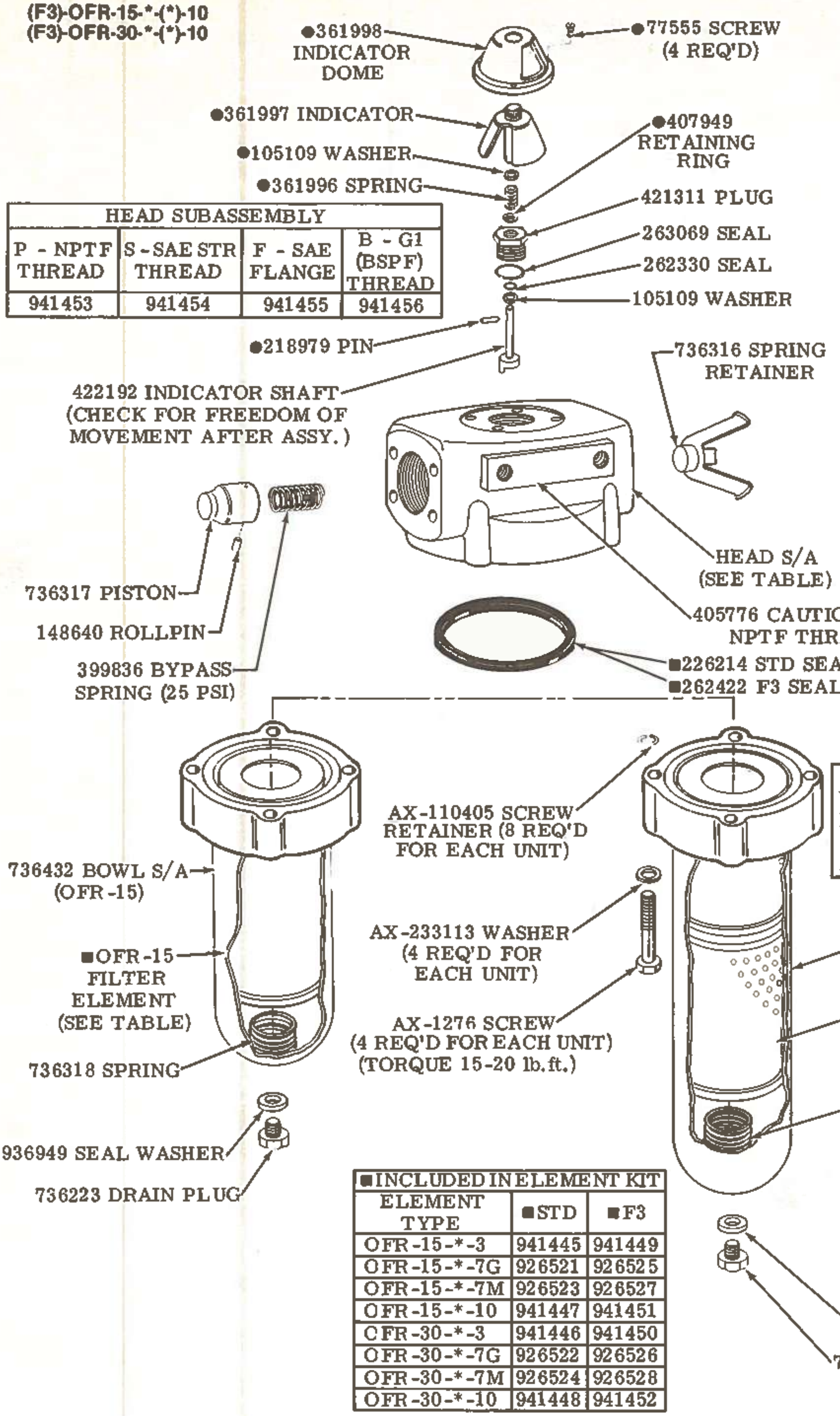
P-NPTF THREAD	S-SAE STR THREAD	F - SAE FLANGE
941421	941422	941423

CTURED
LARGE
NDARD).
OR MIN-
UIDS.

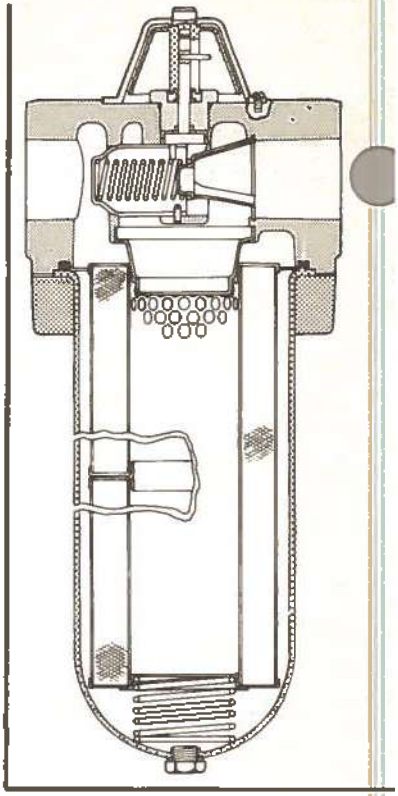
ANICAL INDICATOR
OTED WITH A "●"
(LESS INDICATOR)
PAGE FOR ELEC-
ARTS.

■INCLUDED IN ELEMENT KIT		
ELEMENT TYPE	■STD	■F3
OFR-60-*-3	941409	941417
OFR-60-*-7G	926513	926517
OFR-60-*-7M	926515	926519
OFR-60-*-10	941411	941419
OFR-120-*-3	941410	941418
OFR-120-*-7G	926514	926518
OFR-120-*-7M	926516	926520
OFR-120-*-10	941412	941420

(F3)-OFR-15-*-(*)-10
(F3)-OFR-30-*-(*)-10



HEAD SUBASSEMBLY			
P - NPTF THREAD	S - SAE STR THREAD	F - SAE FLANGE	B - G1 (BSPF) THREAD
941453	941454	941455	941456



NOTE: THESE UNITS ARE MA WITH ALL SEALS F3 EXCEP BOWL SEAL WHICH IS NITRIL CHANGE THE BOWL SEAL TO ERAL OIL AND FIRE RESISTA

■INCLUDED IN ELEMENT KIT		
ELEMENT TYPE	■STD	■F3
OFR-15-*-3	941445	941449
OFR-15-*-7G	926521	926525
OFR-15-*-7M	926523	926527
OFR-15-*-10	941447	941451
OFR-30-*-3	941446	941450
OFR-30-*-7G	926522	926526
OFR-30-*-7M	926524	926528
OFR-30-*-10	941448	941452

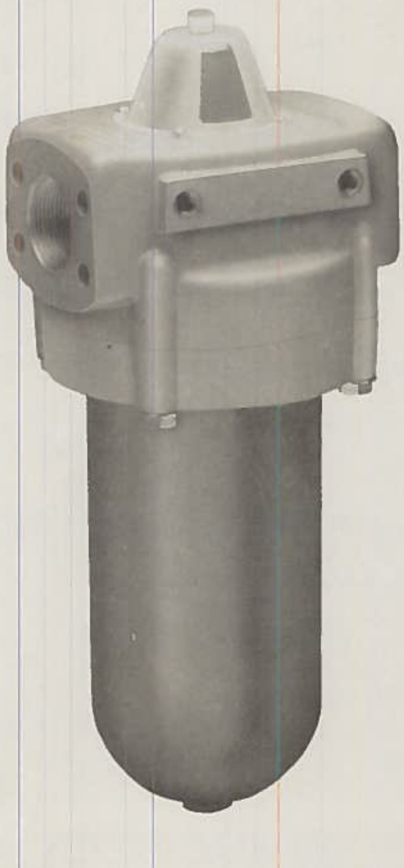
●INCLUDED IN KIT 941003. PA ARE OMITTED O MODELS. SEE TRICAL INDICA

Service Parts Information

VICKERS®
A TRINOVA COMPANY

Large Return Line Filter

(F3)-OFR-15-*-(*)-10
(F3)-OFR-30-*-(*)-10
(F3)-OFR-60-*-(*)-10
(F3-OFR-120-*-(*)-10



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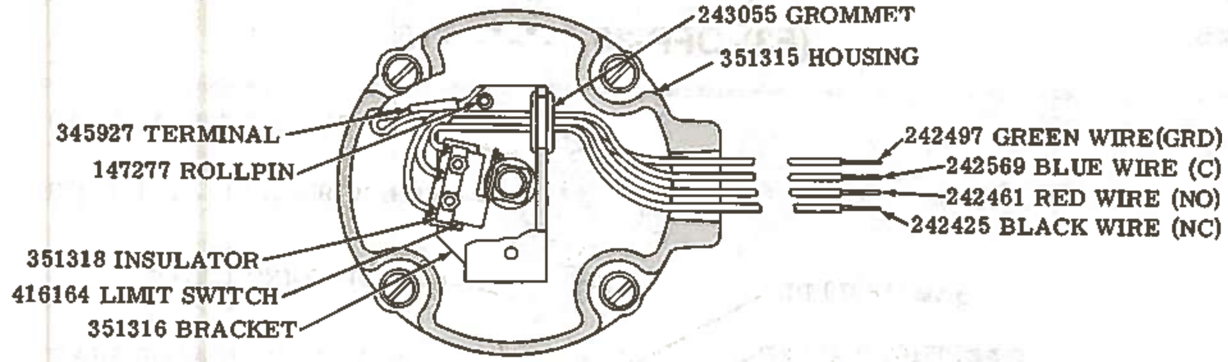
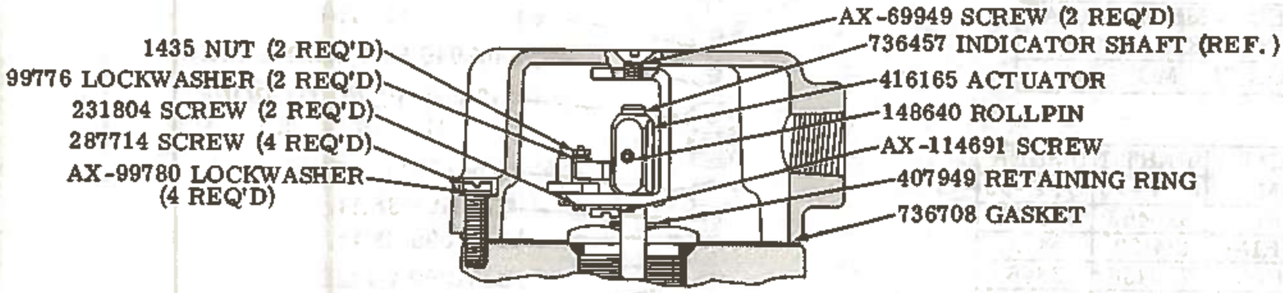
Revised 9-1-85

I-3957-S

Electrical Indicator Parts
Kit 942400





MODEL CODE BREAKDOWN

(F3)-OFP-*-*-*-*-*-10

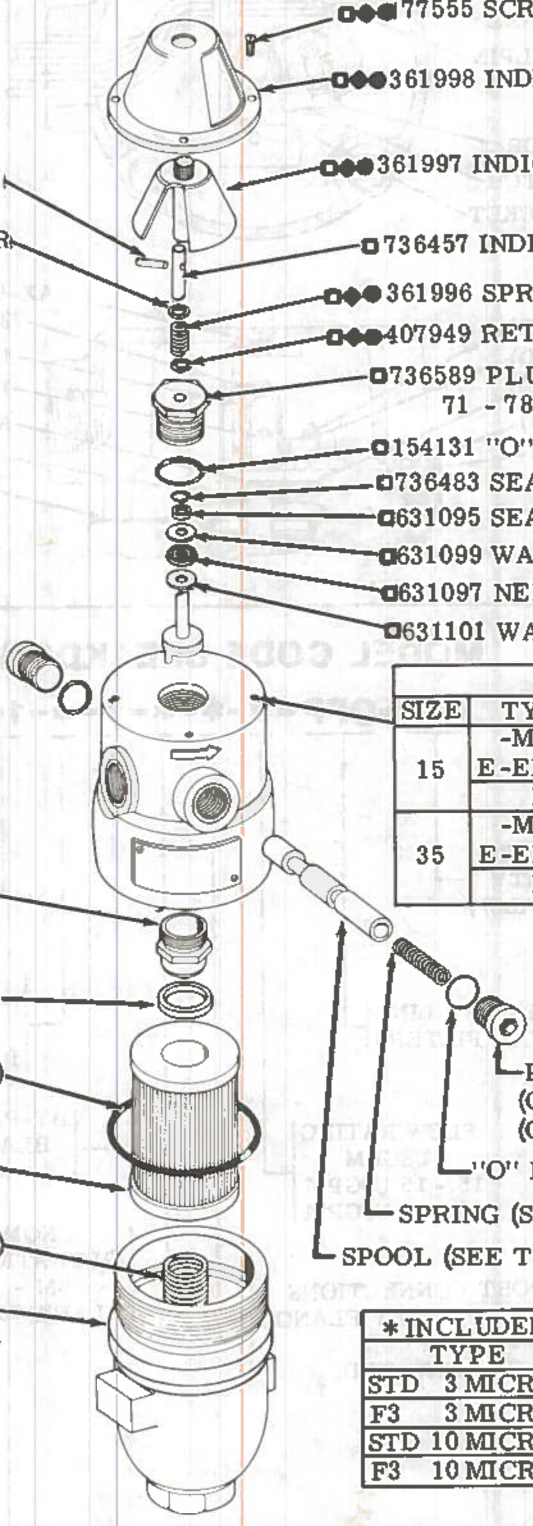
- (F3) — MULTI-FLUID CAPABILITY (VITON SEALS)
- OFP — PRESSURE LINE OIL FILTERS
- FLOW RATING USGPM
  - 15 - 15 USGPM
  - 35 - 35 USGPM
- PORT CONNECTIONS
  - F - SAE 4 BOLT FLANGE
  - P - 1" NPTF
  - S - SAE STR. THD.
- NOMINAL FILTRATION RATING
  - 3M - 3 MICRON
  - BLANK - 10 MICRON
- BY-PASS SETTING
  - BLANK - 40 PSI STANDARD
- INDICATOR
  - E - ELECTRICAL
  - L - LESS INDICATOR
  - BLANK - MECHANICAL
- 10 — DESIGN

Service Parts Information

VICKERS
A TRINOVA COMPANY

Pressure Line Filters

(F3)-OFP-15-*-*-*-*-10
(F3)-OFP-35-*-*-*-*-10



●INCLUDED IN MECHANICAL INDICATOR KIT 941003
□OMIT ON "L" MODELS

PART NAME	PART NUMBER OFP-15	OFP-35
PLUG	329463	326976
"O" RING	154129	154131
SPRING	736436	736463
SPOOL	736590	736591
BEZEL	736413	736470
*SEAL	154018	154022
*BOWL "O" RING	380648	200162
BOWL SPRING	736438	736471
BOWL	736440	736447

◆HEAD				
SIZE	TYPE	F	P	S
15	-MECH. E-ELECT.	—	736418	736419
	L	—	736592	736593
35	-MECH. E-ELECT.	736466	736467	736468
	L	736600	736601	736602

*INCLUDED IN ELEMENT KIT		
TYPE	OFP-15	OFP-35
STD 3 MICRON	926410	926414
F3 3 MICRON	926411	926415
STD 10 MICRON	926412	926416
F3 10 MICRON	926413	926417

◆NOT AVAILABLE FOR SALE AS INDIVIDUAL PARTS

Revised 5-1-87

I-3958-S

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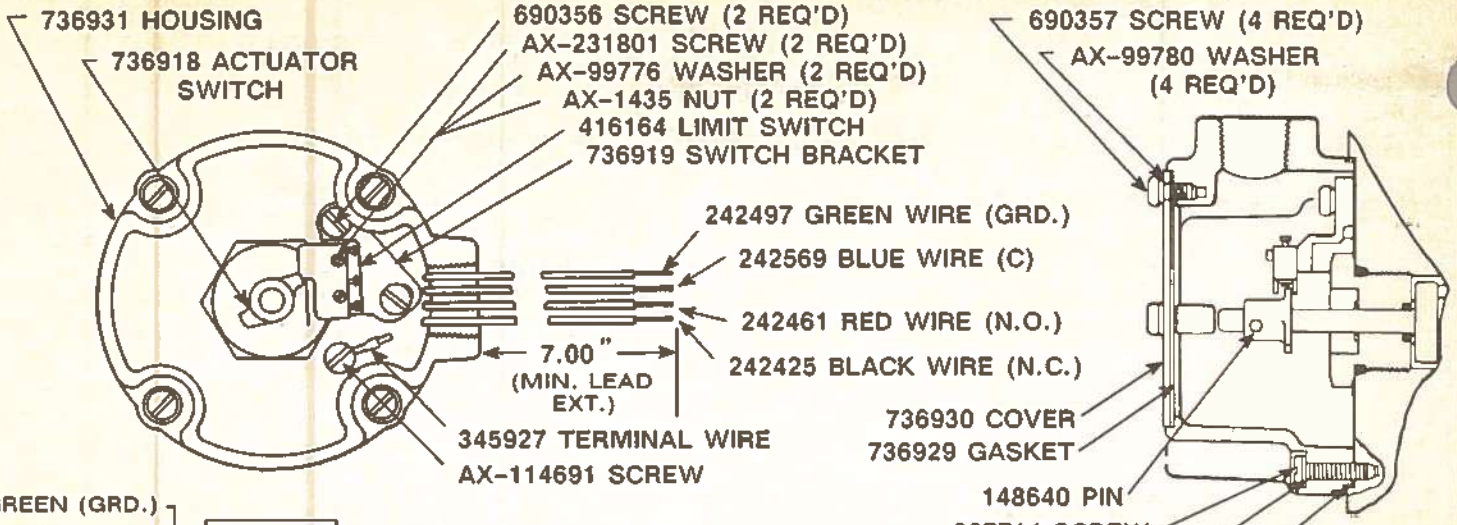
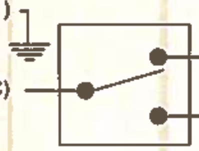
P.O. Box 302
Troy, Michigan 48007-0302

ELECTRICAL INDICATOR PARTS (KIT 926586)





NOTE: ADJUST SWITCH POSITION SO SWITCH CONTACTS MAKE AND BREAK WITH BY-PASS VALVE PISTON MOVEMENT BETWEEN SEATED AND .12 INCH OPEN.

MODEL CODE BREAKDOWN

(F3) – OFR – * – * – (*) – (*) – (*) – *

[1] [2] [3] [4] [5] [6] [7] [8]

[1] SPECIAL SEALS

SEALS FOR MINERAL OIL & FIRE RESISTANT FLUIDS

[2] OIL FILTER

RETURN LINE

[3] FLOW RATING – USGPM

15 (SHORT) – 15 USGPM	60 (SHORT) – 60 USGPM
30 (LONG) – 30 USGPM	120 (LONG) – 120 USGPM

[4] PORT CONNECTIONS

B – G1 (BSPF) THREAD (15 & 30 USGPM ONLY)
F – SAE FLANGE
P – NPTF THREAD
S – SAE STRAIGHT THREAD

[5] NOMINAL FILTRATION RATING

3M – 3 MICROMETRE
7G – 7 MICROMETRE (GLASS MEDIA)
7M – 7 MICROMETRE
BLANK – 10 MICROMETRE

[6] INDICATOR TYPE

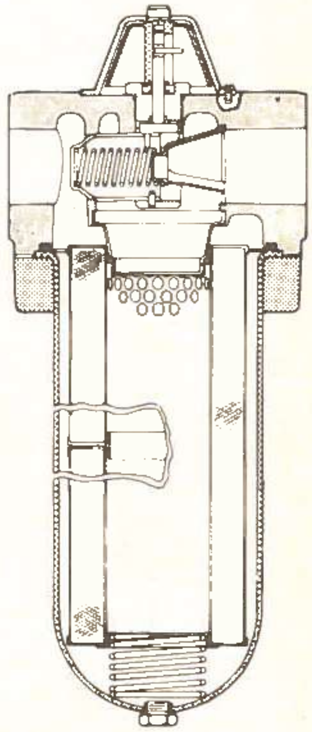
E – ELECTRICAL INDICATOR
BLANK – MECHANICAL INDICATOR

[7] BY-PASS PRESSURE SETTING

35 – 35 PSI
BLANK – 25 PSI

[8] DESIGN

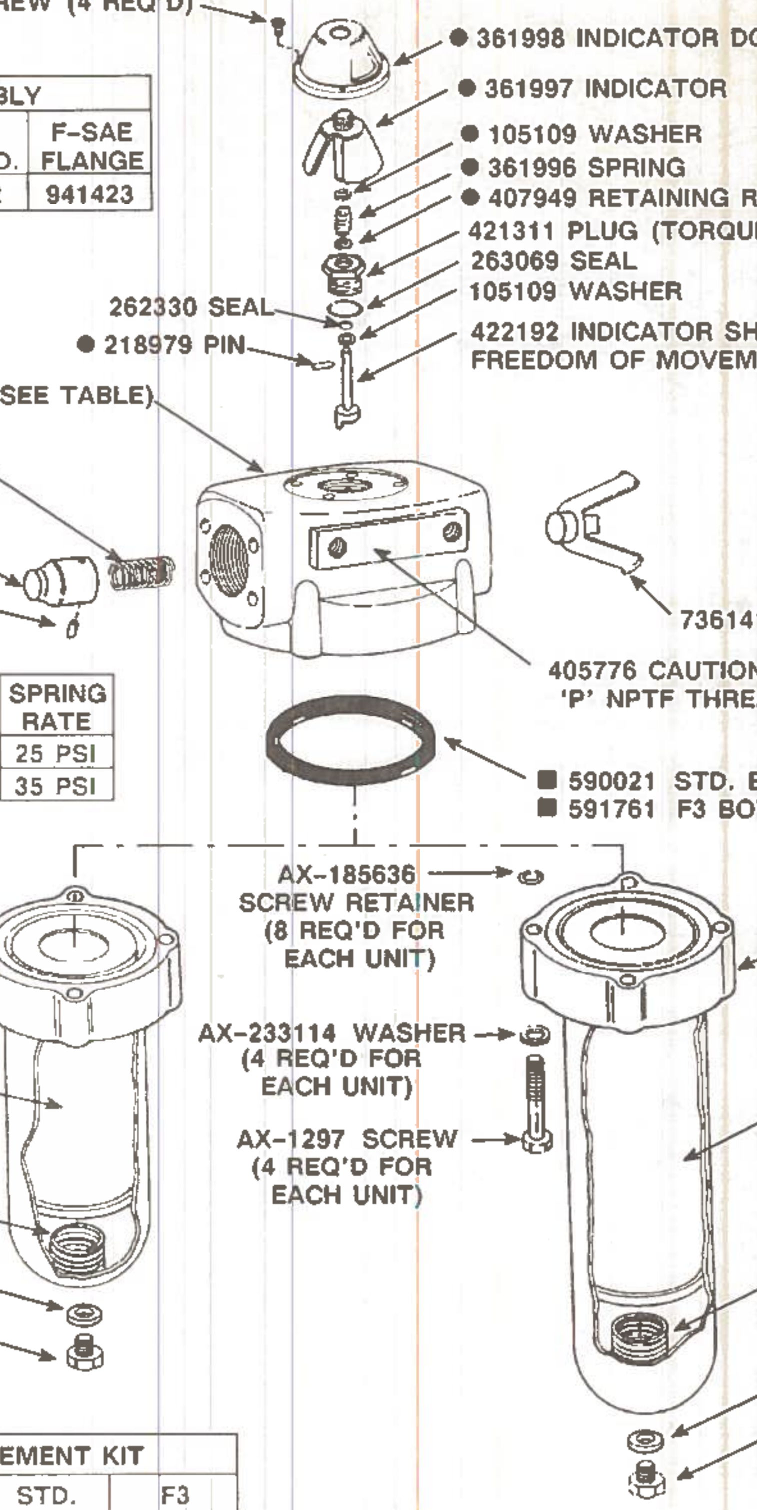
11 – MECHANICAL INDICATOR
20 – ELECTRICAL INDICATOR



SECTIONAL VIEW
(OFR-60/120 SHOWN)

Litho in U.S.A.

OFR-60-*-(*)-(*)-(*)-11/20
OFR-120-*-(*)-(*)-(*)-11/20



HEAD SUBASSEMBLY			
MODEL	P-NPTF THD.	S-SAE STR THD.	F-SAE FLANGE
OFR-60/120	941421	941422	941423

MODEL	BYPASS SPRING	SPRING RATE
OFR-60/120	420606	25 PSI
	736831	35 PSI

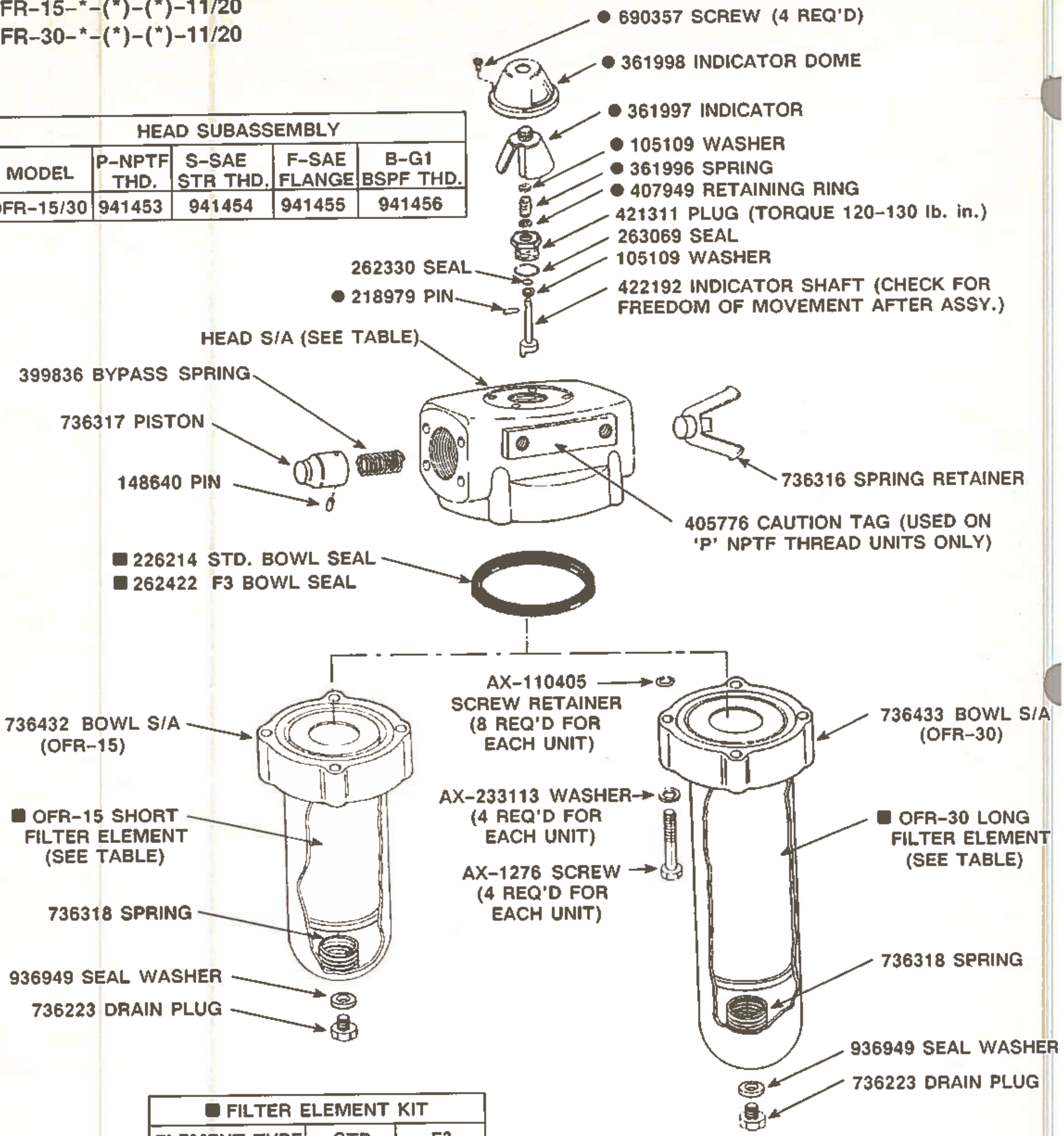
■ FILTER ELEMENT KIT		
ELEMENT TYPE	STD.	F3
OFR-60-*-3M	941409	941417
OFR-60-*-7G	926513	926517
OFR-60-*-7M	926515	926519
OFR-60-*-10	941411	941419
OFR-120-*-3M	941410	941418
OFR-120-*-7G	926514	926518
OFR-120-*-7M	926516	926520
OFR-120-*-10	941412	941420

■ - INCLUDED IN FILTER ELEMENT KIT

● - INCLUDED IN MECHANICAL INDICATOR KIT 941003. SEE BACK PAGE FOR 'E' (ELECTRICAL INDICATOR) PARTS.

OFR-15-*-(*)-(*)-11/20
OFR-30-*-(*)-(*)-11/20

HEAD SUBASSEMBLY				
MODEL	P-NPTF THD.	S-SAE STR THD.	F-SAE FLANGE	B-G1 BSPF THD.
OFR-15/30	941453	941454	941455	941456



■ FILTER ELEMENT KIT		
ELEMENT TYPE	STD.	F3
OFR-15-*-3M	941445	941449
OFR-15-*-7G	926521	926525
OFR-15-*-7M	926523	926527
OFR-15-*-10	941447	941451
OFR-30-*-3M	941446	941450
OFR-30-*-7G	926522	926526
OFR-30-*-7M	926524	926528
OFR-30-*-10	941448	941452

NOTE

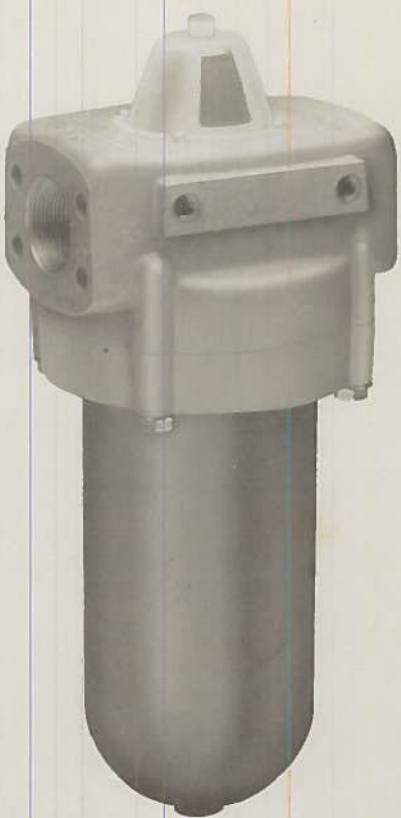
ALL UNITS ARE MANUFACTURED WITH F3 SEALS, EXCEPT THE BOWL SEAL, WHICH IS NITRILE (STANDARD).

VICKERS®
A TRINOVA COMPANY

Service Parts Information

LARGE RETURN LINE FILTER

(F3)-OFR-15-*-(*)-(*)-11/20
(F3)-OFR-30-*-(*)-(*)-11/20
(F3)-OFR-60-*-(*)-(*)-(*)-11/20
(F3)-OFR-120-*-(*)-(*)-(*)-11/20

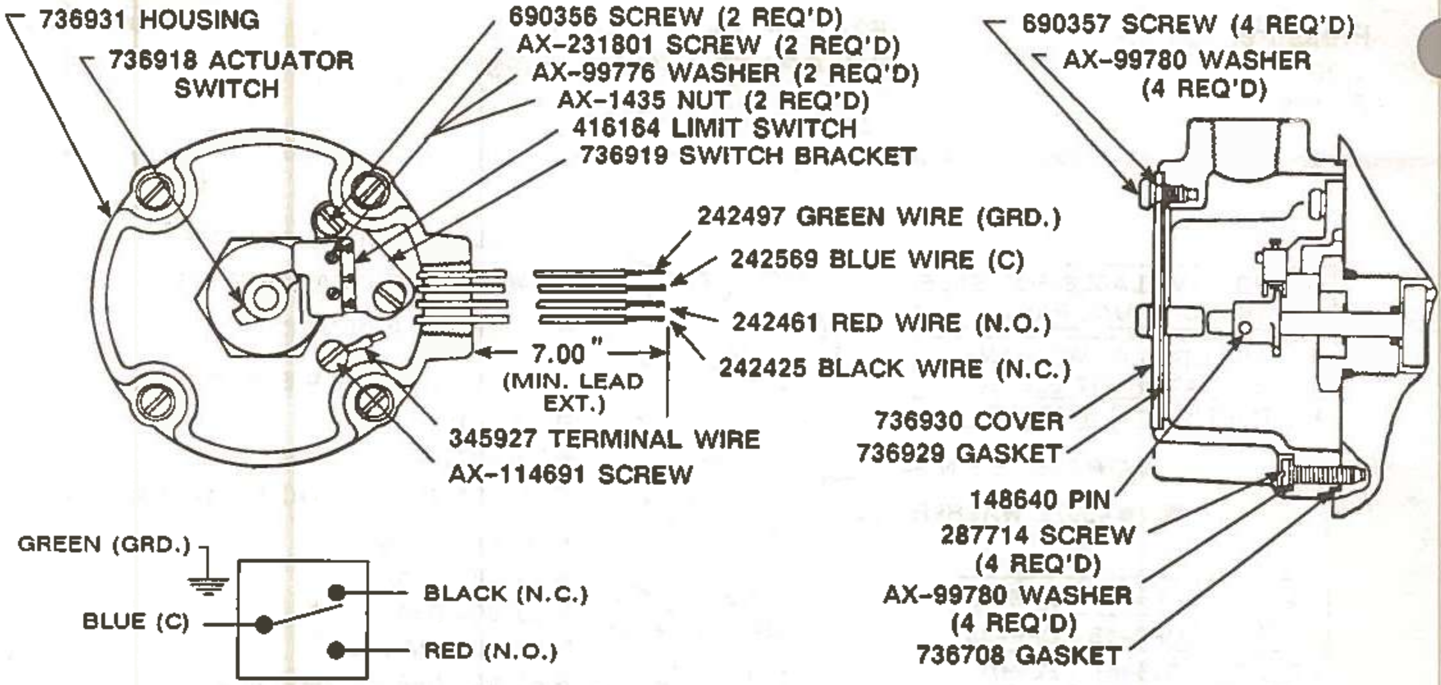


Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Released 11-1-87 I-3959-S

ELECTRICAL INDICATOR PARTS (KIT 926586)



NOTE: ADJUST SWITCH POSITION SO SWITCH CONTACTS MAKE AND BREAK WITH BY-PASS VALVE PISTON MOVEMENT BETWEEN SEATED AND .12 INCH OPEN.

MODEL CODE BREAKDOWN

(F3) – OFP – * – * – * – * – * – *

[1] [2] [3] [4] [5] [6] [7] [8]

[1] SPECIAL SEALS

SEALS FOR MINERAL OIL & FIRE RESISTANT FLUIDS

[2] OIL FILTER – PRESSURE LINE

[3] FLOW RATING – USGPM

15 – 15 USGPM
35 – 35 USGPM

[4] PORT CONNECTIONS

15 SIZE:
- P – 3/4" NPTF THREADS
- S – SAE STRAIGHT THREADS

35 SIZE:
- B – G1 BSPF THREADS
- F – SAE 4 BOLT FLANGE
- P – 1" NPTF THREADS
- S – SAE STRAIGHT THREADS

[5] NOMINAL FILTRATION RATING

3M – 3 MICRON
BLANK – 10 MICRON

[6] BY-PASS PRESSURE SETTING

BLANK – 40 PSI (STD.)

[7] INDICATOR

E – ELECTRICAL
L – LESS INDICATOR
BLANK – MECHANICAL

[8] DESIGN

11 – MECHANICAL INDICATOR
20 – ELECTRICAL INDICATOR

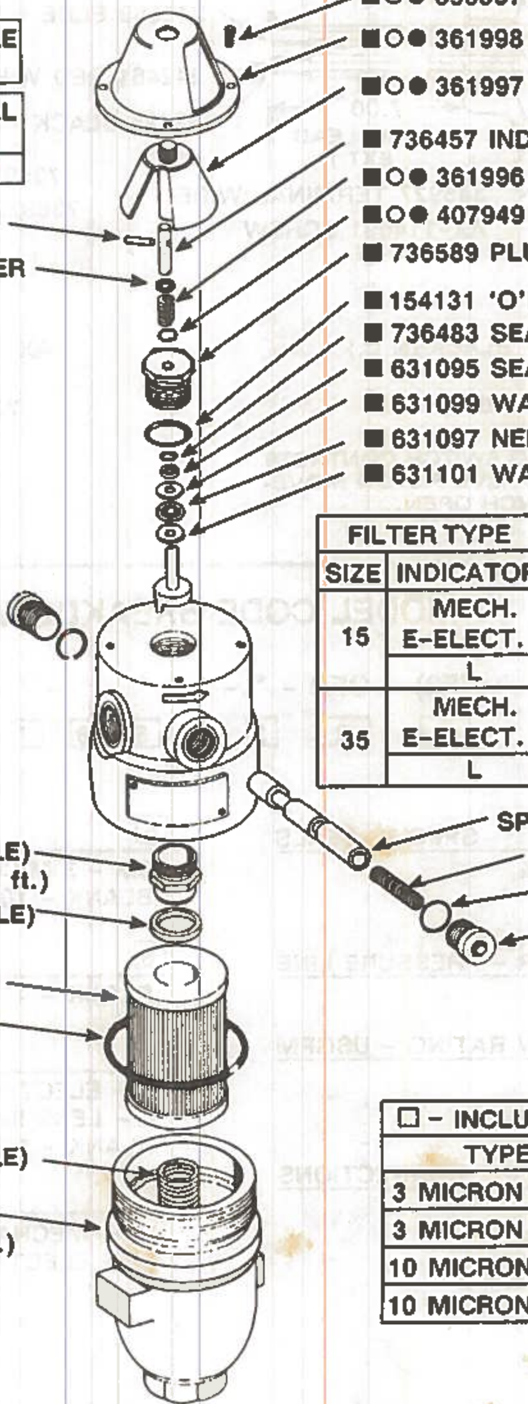
Service Parts Information

VICKERS
A TRINOVA COMPANY

Pressure Line Filters

(F3)-OFP-15-*-*-*-*-11/20
(F3)-OFP-35-*-*-*-*-11/20

○ - NOT AVAILABLE FOR SALE AS INDIVIDUAL PARTS
● - INCLUDED IN MECHANICAL INDICATOR KIT 926588
■ - OMIT ON 'L' MODELS



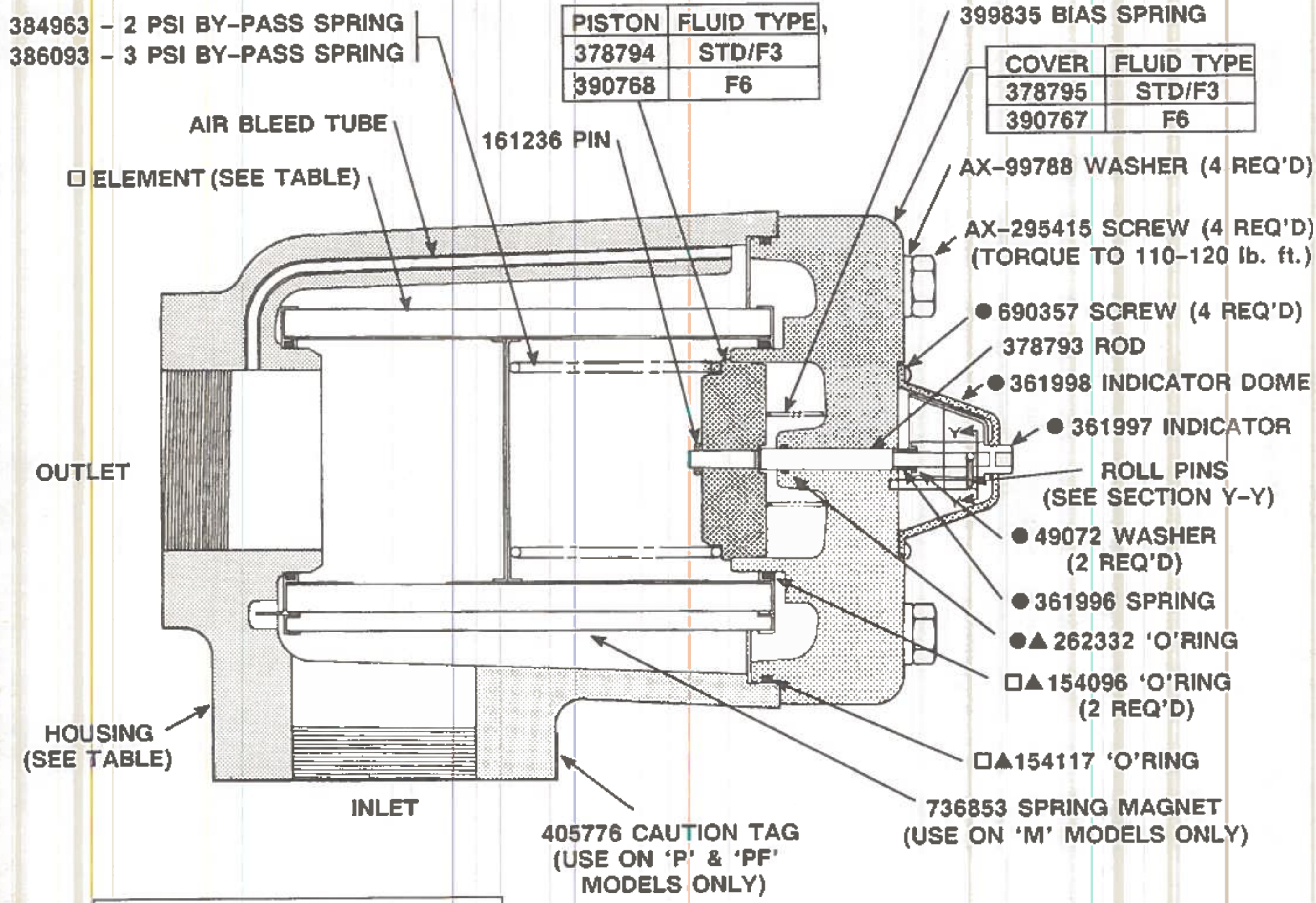
PART NAME	PART NUMBER	
	OFP-15	OFP-35
PLUG	329463	326976
'O' RING	154129	154131
SPRING	736436	736463
SPOOL	736590	736591
BEZEL	736413	736470
SEAL	154018	154022
BOWL 'O' RING	380648	200162
BOWL SPRING	736438	736471
BOWL	736440	736447

FILTER TYPE		○ HEAD TYPE			
SIZE	INDICATOR	B	F	P	S
15	MECH. E-ELECT.	—	—	736418	736419
	L	—	—	736592	736593
35	MECH. E-ELECT.	736469	736466	736467	736468
	L	736603	736600	736601	736602

□ - INCLUDED IN ELEMENT KIT		
TYPE	OFP-15	OFP-35
3 MICRON (STD)	926410	926414
3 MICRON (F3)	926411	926415
10 MICRON (STD)	926412	926416
10 MICRON (F3)	926413	926417

Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48084

(F*)-100F*-**-*-*-*-12/20
97 & 140 GPM INLET FILTER



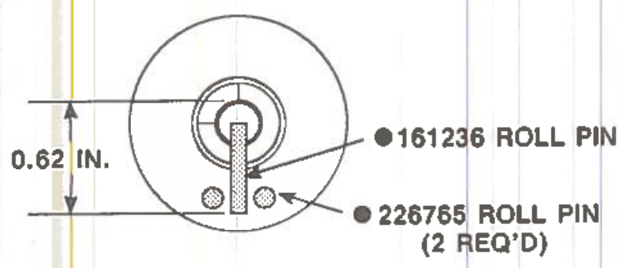
PISTON	FLUID TYPE
378794	STD/F3
390768	F6

COVER	FLUID TYPE
378795	STD/F3
390767	F6

NOTE
INLET PORT MUST FACE DOWNWARD FOR AIR BLEED FEATURE TO FUNCTION PROPERLY.

□ - INCLUDED IN FILTER ELEMENT KITS			
MODEL	ELEMENT	STD.	F3
100FE/F- 1*-*-12/20	378991	941064	941065
100FE/F- 2*-*-12/20	378990	941066	941067

HOUSING			
PORT CONNECTION		PORT SIZE & FLOW RATING	
		'E' - 3" 97 USGPM	'F' - 3-1/2" 140 USGPM
P	STD/F3	378998	378999
	F6	390763	390764
F	STD/F3	378995	378996
	F6	390765	390766
PF	STD/F3	573013	573014
	F6	573028	573029



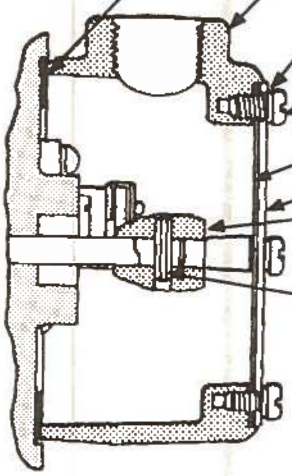
SECTION Y-Y

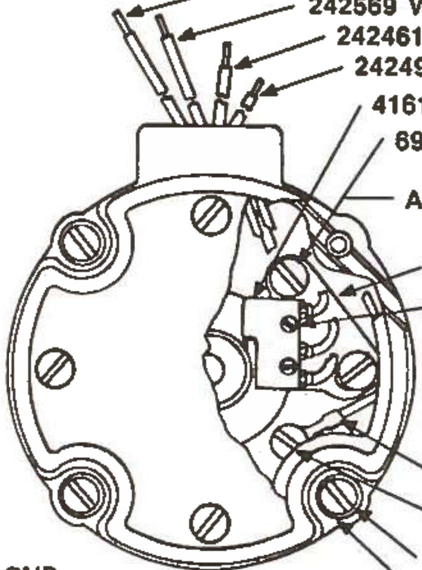
▲ - INCLUDED IN 919740 SEAL KIT FOR STD. & F6. F3 EQUIVALENT 919741 SEAL KIT

● - INCLUDED IN MECHANICAL INDICATOR KIT 942477

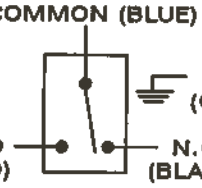
ELECTRICAL INDICATOR PARTS (ALL MODELS)
(KIT 926587)

-⊖- - 100F* MODELS REQUIRE (2) AX-231084 SCREWS AND (1) 351318 INSULATOR.





NOTE: ADJUST SWITCH POSITION SO CONTACTS MAKE AND BREAK WITH ACTUATOR MOVEMENT BETWEEN .25 - .38.



SWITCH WIRING

MODEL CODE BREAKDOWN

(F*) - ** F * - * * - * - * - * - **

[1] [2][3][4] [5][6] [7] [8] [9] [10]

[1] SPECIAL SEALS

F3 - SEALS FOR MINERAL OIL & FIRE RESISTANT FLUID

F6 - SEALS FOR OIL-IN WATER EMULSION FLUID

(OMIT FOR STD. PETROLEUM BASED FLUID)

[2] FILTER PACKAGE SIZE

10, 50, 100

[3] INLET FILTER WITH AIR BLEED

[4] PORT SIZE & FLOW RATING

A - 1 INCH (12 GPM)
B - 1 1/2 INCH (28 GPM)
C - 2 INCH (47 GPM)
D - 2 1/2 INCH (67 GPM)
E - 3 INCH (97 GPM)
F - 3 1/2 INCH (140 GPM)

[5] FILTER ELEMENT MICRON RATING

1 - 100 MESH (149 MICRON)
2 - 200 MESH (74 MICRON)

[6] PORT CONNECTIONS

B - G1 BSPF THREAD
F - SAE FLANGE
P - NPTF THREAD
S - SAE STRAIGHT THREAD
PF - NPTF THD. (INLET PORT) SAE FLANGE (OUTLET PORT)
SF - SAE STRAIGHT THD. (INLET PORT) SAE FLANGE (OUTLET PORT)

[7] INDICATOR TYPE

E - ELECTRICAL
L - LESS INDICATOR
BLANK - MECHANICAL

[8] BY-PASS SPRING

3 - 3 PSI BY-PASS SPRING
BLANK - 2 PSI BY-PASS SPRING

[9] MAGNET

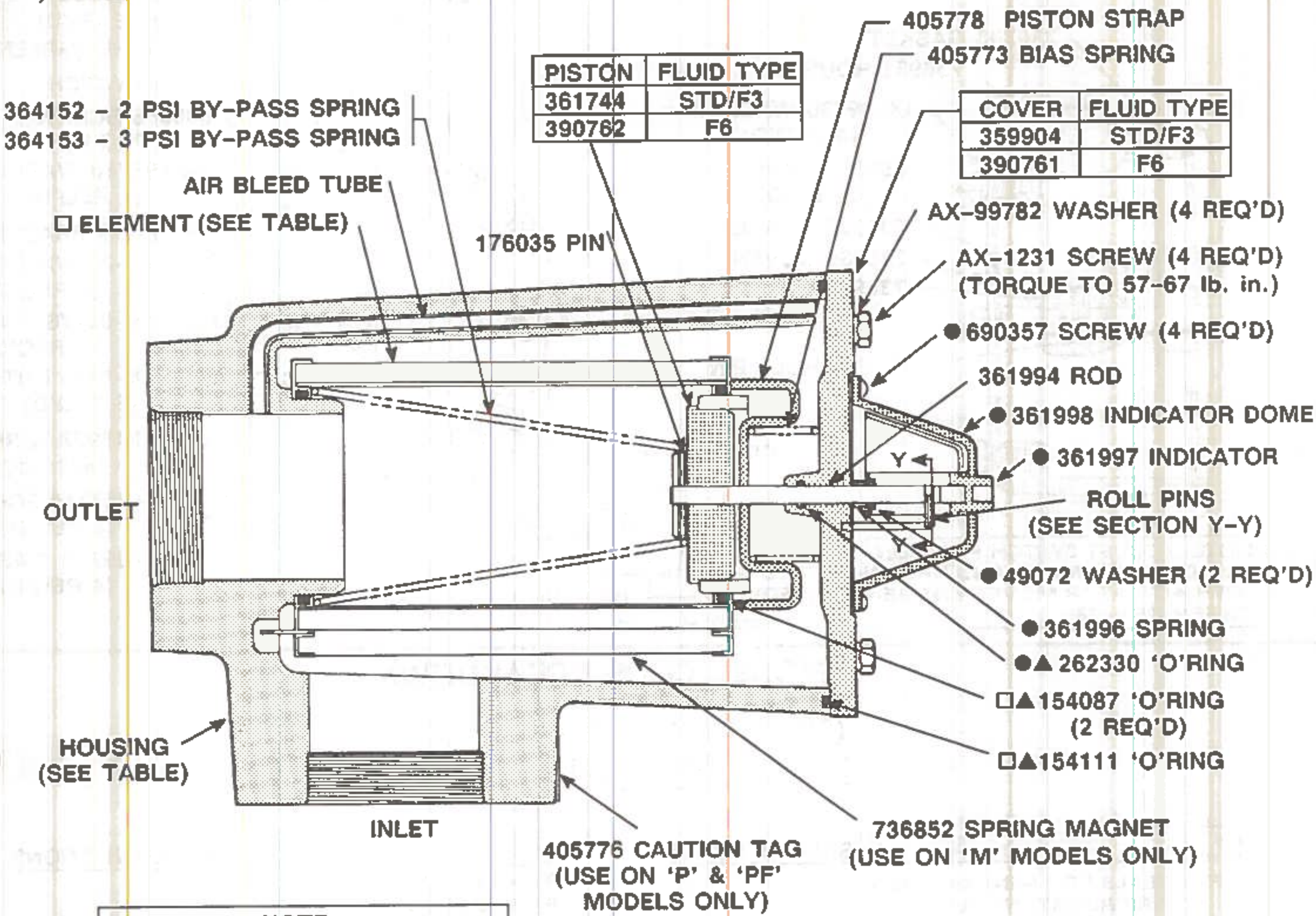
M - MAGNET
BLANK - MAGNET OMITTED

[10] DESIGN

12 - MECHANICAL OR LESS INDICATOR TYPE
20 - ELECTRICAL INDICATOR TYPE

Litho in U.S.A.

(F*)-50F*-**-*-*-*-12/20
28, 47 & 67 GPM INLET FILTER

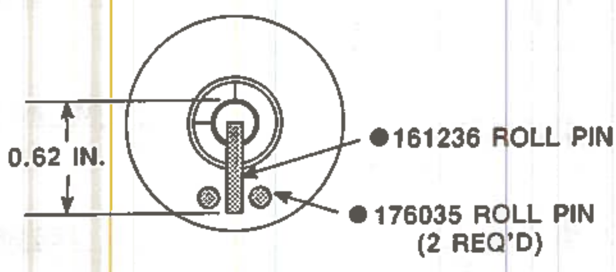


PISTON	FLUID TYPE
361744	STD/F3
390762	F6

COVER	FLUID TYPE
359904	STD/F3
390761	F6

NOTE
INLET PORT MUST FACE DOWNWARD FOR AIR BLEED FEATURE TO FUNCTION PROPERLY.

☐ - INCLUDED IN FILTER ELEMENT KITS			
MODEL	ELEMENT	STD.	F3
50FB-1*-*-12/20	361991	941056	941057
50FB-2*-*-12/20	361740	941058	941059
50FC/D-1*-*-12/20	361992	941060	941061
50FC/D-2*-*-12/20	361741	941062	941063



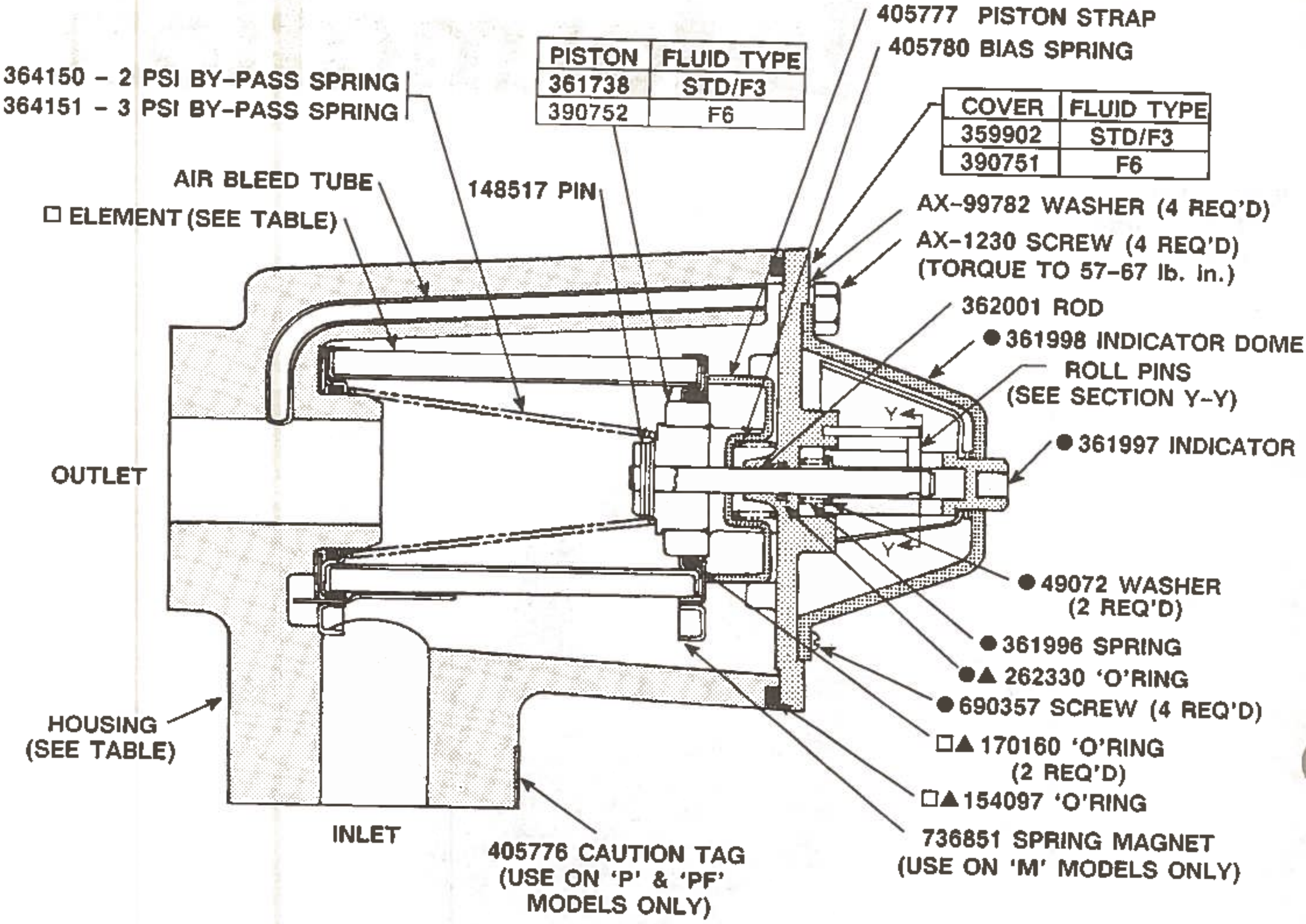
SECTION Y-Y

HOUSING				
PORT CONNECTION		PORT SIZE & FLOW RATING		
		'B' - 1-1/2" 28 USGPM	'C' - 2" 47 USGPM	'D' - 2-1/2" 67 USGPM
P	STD/F3	361750	361751	367137
	F6	390753	390754	390755
S	STD/F3	367128	367129	———
	F6	390756	390757	———
F	STD/F3	367131	367132	367138
	F6	390758	390759	390760
PF	STD/F3	573006	573007	573008
	F6	573023	573024	573025
SF	STD/F3	573010	573011	———
	F6	573026	573027	———

▲ - INCLUDED IN 919643 SEAL KIT FOR STD. & F6. F3 EQUIVALENT 919644 SEAL KIT

● - INCLUDED IN MECHANICAL INDICATOR KIT 942477

(F*)-10FA-**-*-*-*-12/20
12 GPM INLET FILTER

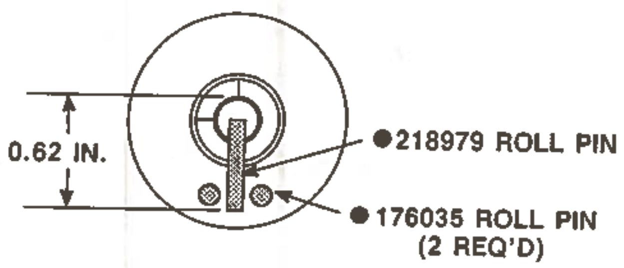


PISTON	FLUID TYPE
361738	STD/F3
390752	F6

COVER	FLUID TYPE
359902	STD/F3
390751	F6

NOTE
INLET PORT MUST FACE DOWNWARD FOR AIR BLEED FEATURE TO FUNCTION PROPERLY.

□ - INCLUDED IN FILTER ELEMENT KITS			
MODEL	ELEMENT	STD.	F3
10FA-1*-*-12/20	361990	941052	941053
10FA-2*-*-12/20	361739	941054	941055



SECTION Y-Y

HOUSING		
PORT CONNECTION		PORT SIZE & FLOW RATING 'A' -1" 12 USGPM
B	STD/F3	575965
	F6	575966
F	STD/F3	367126
	F6	390750
P	STD/F3	359906
	F6	390748
S	STD/F3	362000
	F6	390749
PF	STD/F3	573003
	F6	573021
SF	STD/F3	573004
	F6	573022

▲ - INCLUDED IN 919641 SEAL KIT FOR STD. & F6.
F3 EQUIVALENT 919642 SEAL KIT

● - INCLUDED IN MECHANICAL INDICATOR KIT 942477

VICKERS
A TRINOVA COMPANY

Service Parts Information

Inlet Filters With Air Bleed Feature

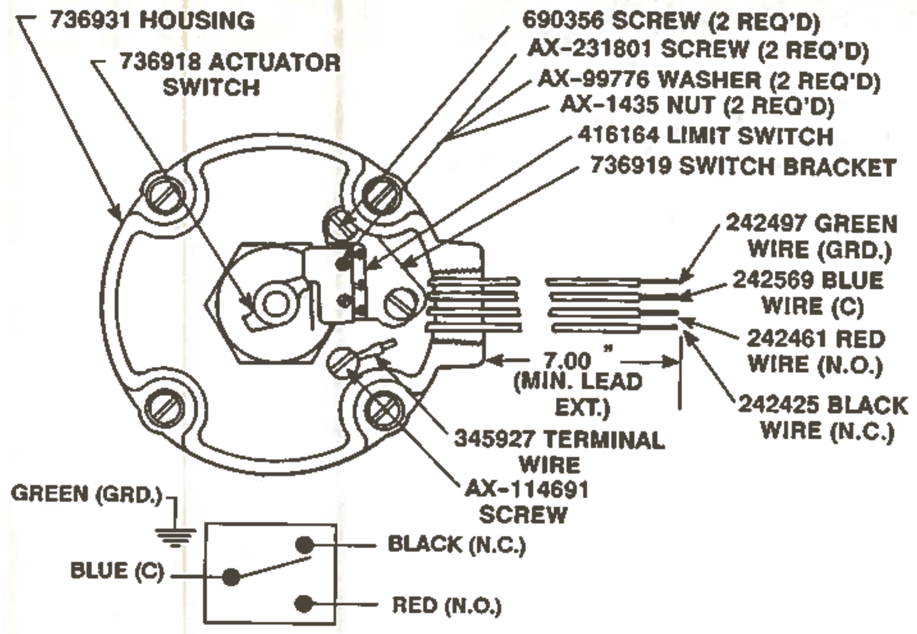
10FA-*-*-*-*-12/20
50F-*-*-*-*-12/20
100F-*-*-*-*-12/20

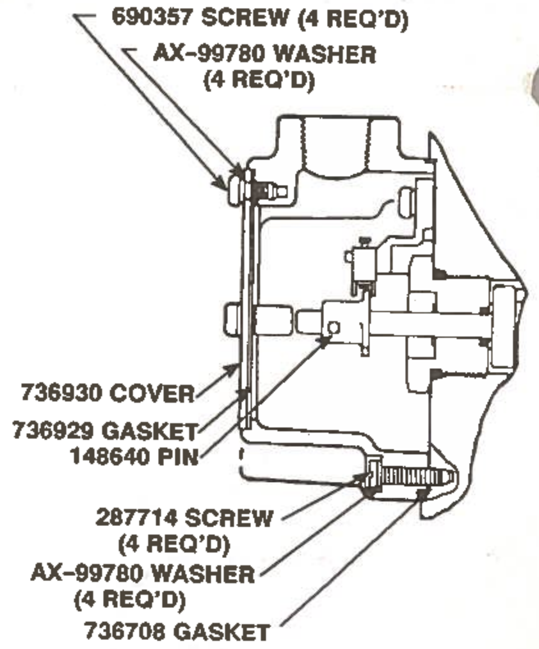
Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Released 12-1-87 **I-3961-S**

ELECTRICAL INDICATOR PARTS (KIT 926586)





NOTE:
ADJUST SWITCH SO CONTACTS MAKE AND BREAK WITH BY-PASS PISTON MOVEMENT BETWEEN SEATED AND .12 INCH OPEN.

MODEL CODE BREAKDOWN

(F3) – OFR – * – * – (*) – (*) – (*) – 30

1 2 3 4 5 6 7 8

1 Special Seals

Seals for mineral oil & fire resistant fluids

2 Oil Filter

Return line

3 Flow Rating – USgpm

15 (Short) – 15 USgpm
30 (Long) – 30 USgpm
60 (Short) – 60 USgpm
120 (Long) – 120 USgpm

4 Port Connections

B – G1 (BSPF) thread (15 & 30 USgpm only)
F – SAE flange
P – NPTF thread
S – SAE straight thread

5 Nominal Filtration Rating

3M – 3 micrometre
7G – 7 micrometre (glass media)
7M – 7 micrometre
Blank – 10 micrometre

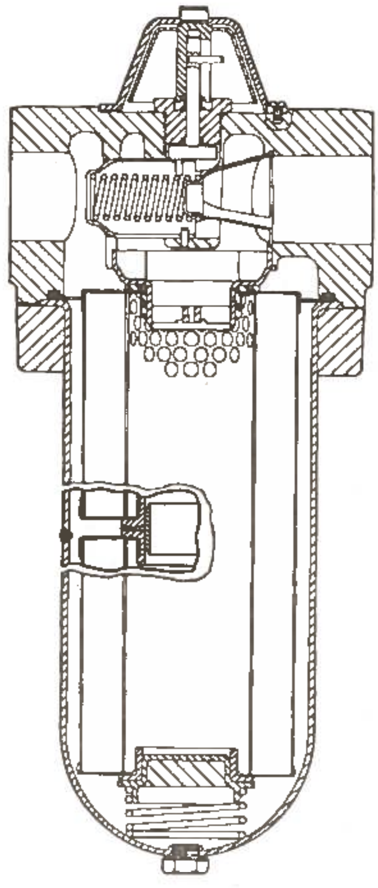
6 Indicator Type

E – Electrical indicator
Blank – Mechanical indicator

7 By-pass Pressure Setting

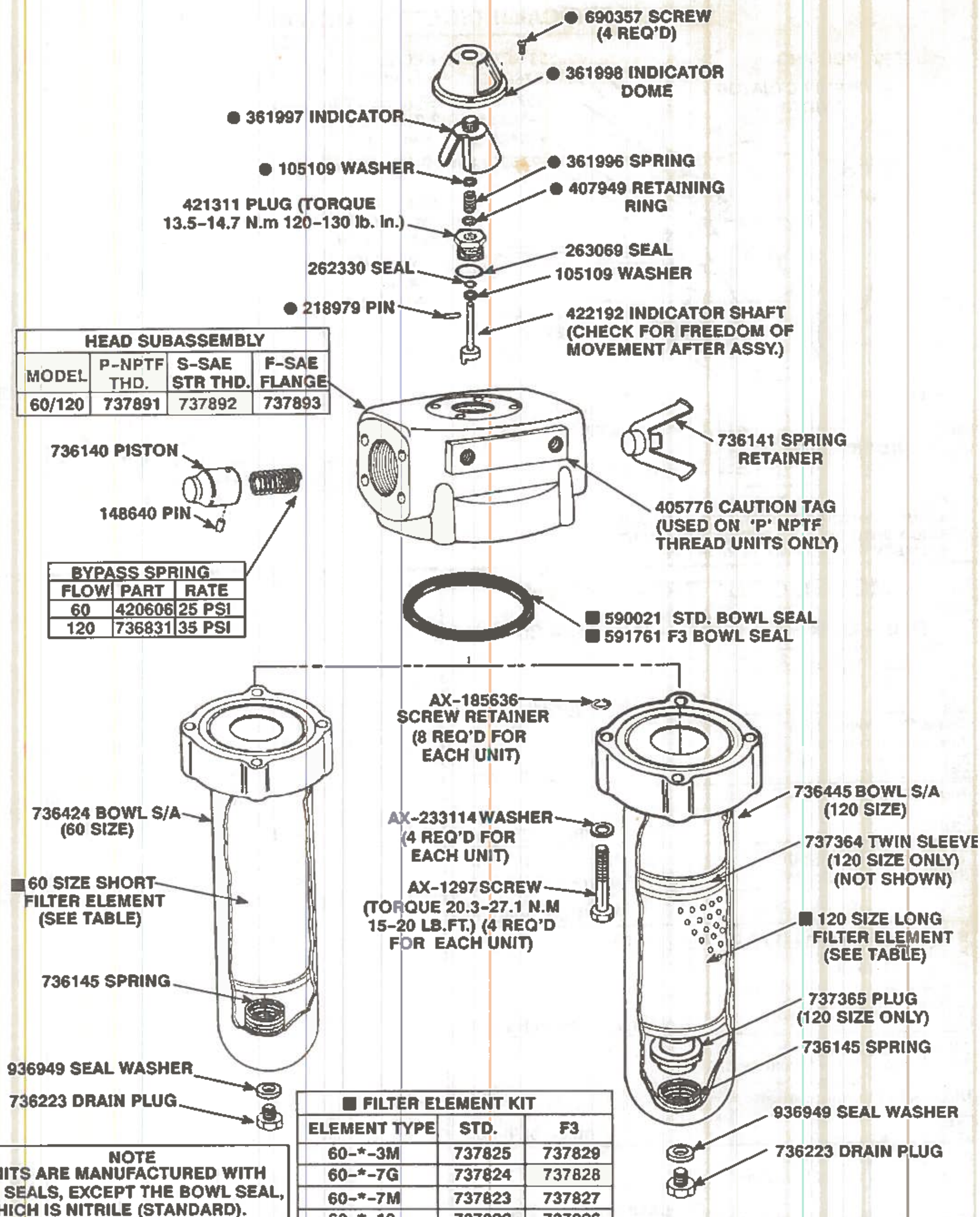
35 – 35 psi
Blank – 25 psi

8 Design



SECTIONAL VIEW
(OFR-120 SHOWN)

Printed in U.S.A.



HEAD SUBASSEMBLY			
MODEL	P-NPTF THD.	S-SAE STR THD.	F-SAE FLANGE
60/120	737891	737892	737893

BYPASS SPRING		
FLOW	PART	RATE
60	420606	25 PSI
120	736831	35 PSI

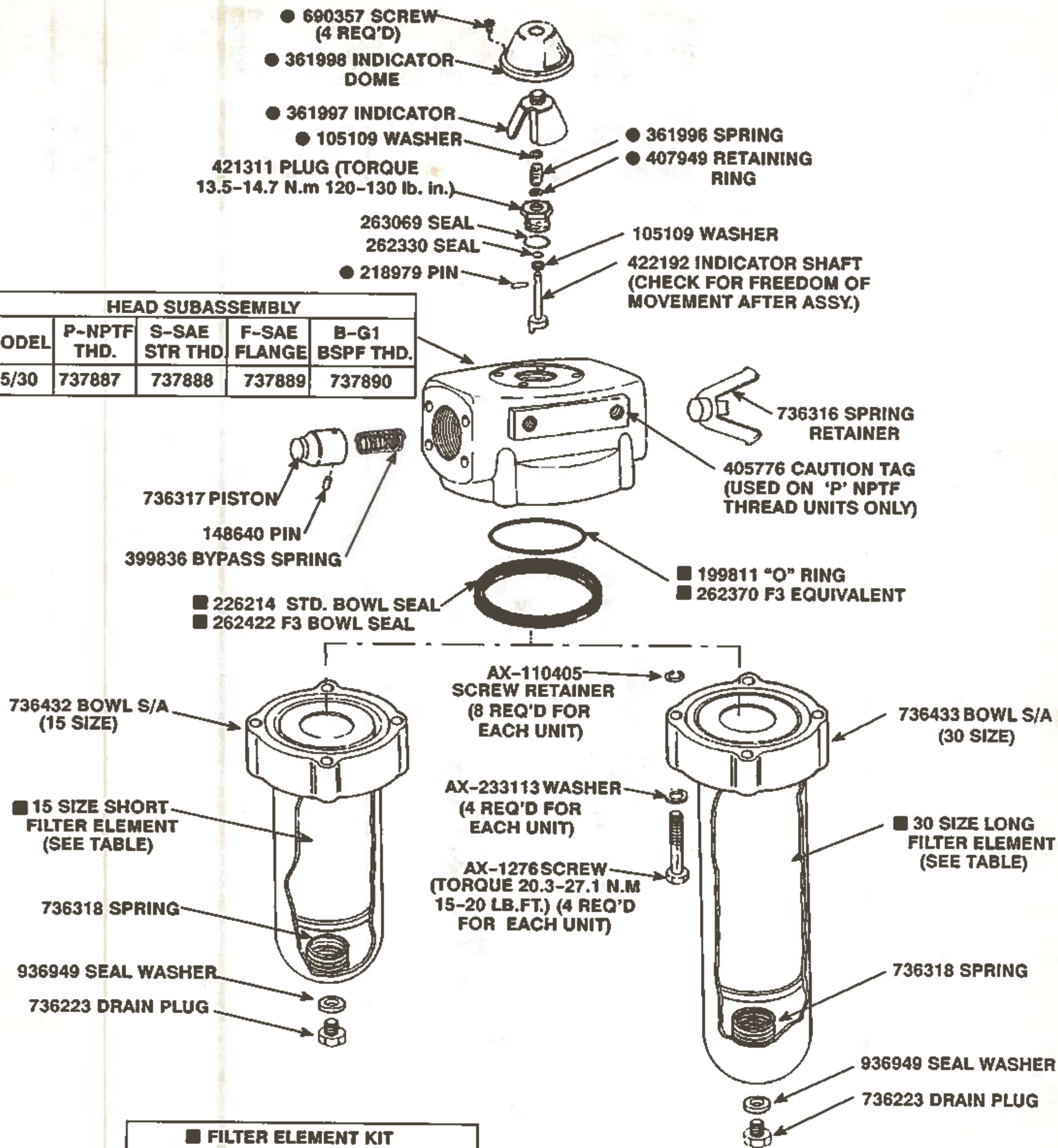
■ FILTER ELEMENT KIT		
ELEMENT TYPE	STD.	F3
60-*-3M	737825	737829
60-*-7G	737824	737828
60-*-7M	737823	737827
60-*-10	737822	737826
120-*-3M	737833	737837
120-*-7G	737832	737836
120-*-7M	737831	737835
120-*-10	737830	737834

NOTE
UNITS ARE MANUFACTURED WITH F3 SEALS, EXCEPT THE BOWL SEAL, WHICH IS NITRILE (STANDARD).

NOTE
-30 DESIGN UNITS ARE NOT INTERCHANGEABLE WITH ANY PREVIOUS DESIGNS.

■ INCLUDED IN ELEMENT KIT

● INCLUDED IN MECHANICAL INDICATOR KIT 941003. SEE BACK PAGE FOR ELECTRICAL INDICATOR PARTS.



HEAD SUBASSEMBLY				
MODEL	P-NPTF THD.	S-SAE STR THD.	F-SAE FLANGE	B-G1 BSPF THD.
15/30	737887	737888	737889	737890

■ FILTER ELEMENT KIT		
ELEMENT TYPE	STD.	F3
15-*-3M	737841	737845
15-*-7G	737840	737844
15-*-7M	737839	737843
15-*-10	737838	737842
30-*-3M	737849	737853
30-*-7G	737848	737852
30-*-7M	737847	737851
30-*-10	737846	737850

NOTE
UNITS ARE MANUFACTURED WITH F3 SEALS, EXCEPT THE BOWL SEAL, WHICH IS NITRILE (STANDARD).

NOTE
-30 DESIGN UNITS ARE NOT INTERCHANGEABLE WITH ANY PREVIOUS DESIGNS.

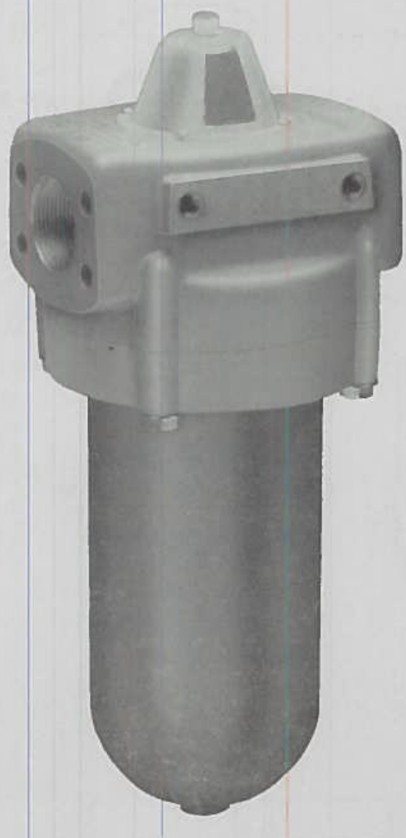
VICKERS®

A TRINOVA COMPANY

Service Parts Information

LARGE RETURN
LINE FILTER

(F3)-OFR-15-*-(*)-(*)-30
(F3)-OFR-30-*-(*)-(*)-30
(F3)-OFR-60-*-(*)-(*)-(*)-30
(F3)-OFR-120-*-(*)-(*)-(*)-30



Vickers, Incorporated

P.O. Box 302
Troy, Michigan
48007-0302

Released 9-1-89

I-3964-S

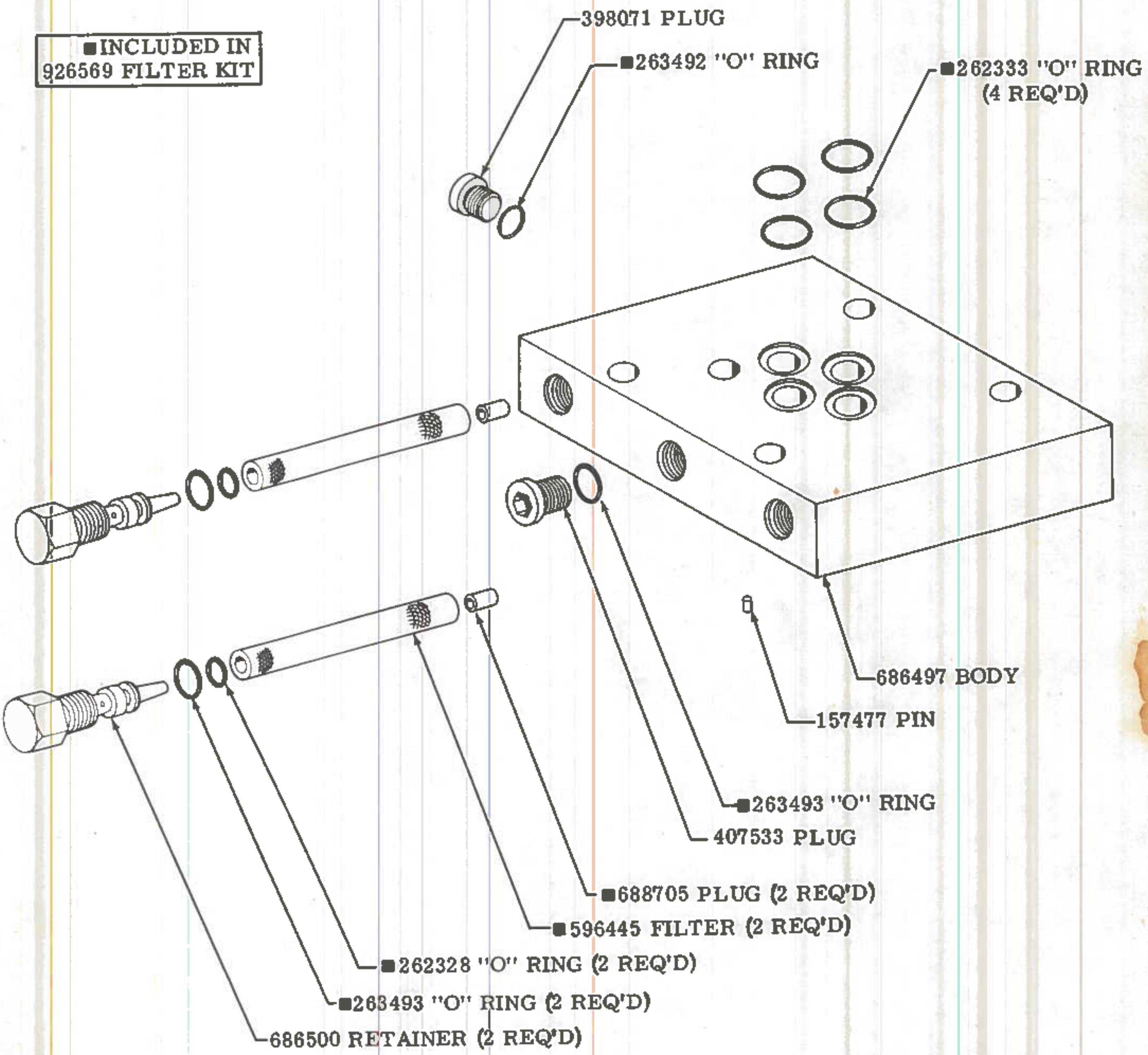
Service Parts Information

VICKERS
A TRINOVA COMPANY

DUAL FILTER MODULE

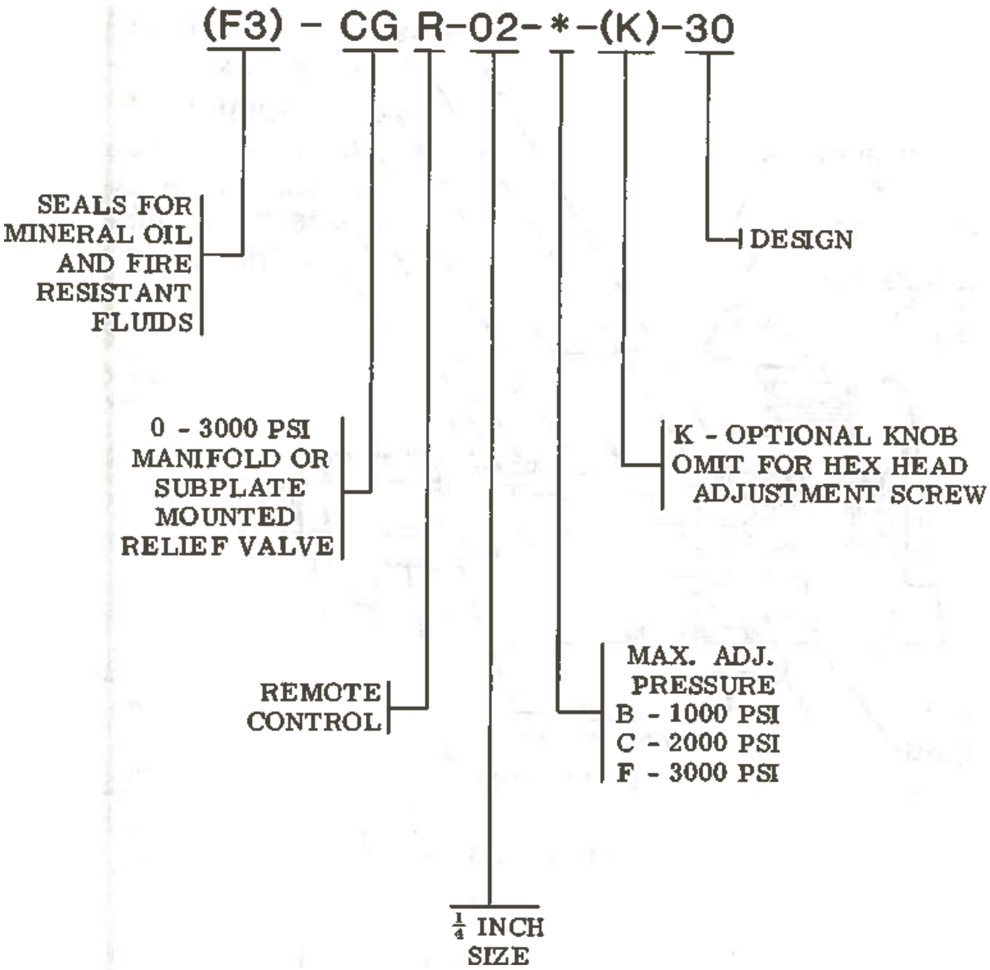
SM4FM-20/30-10

■ INCLUDED IN 926569 FILTER KIT



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN



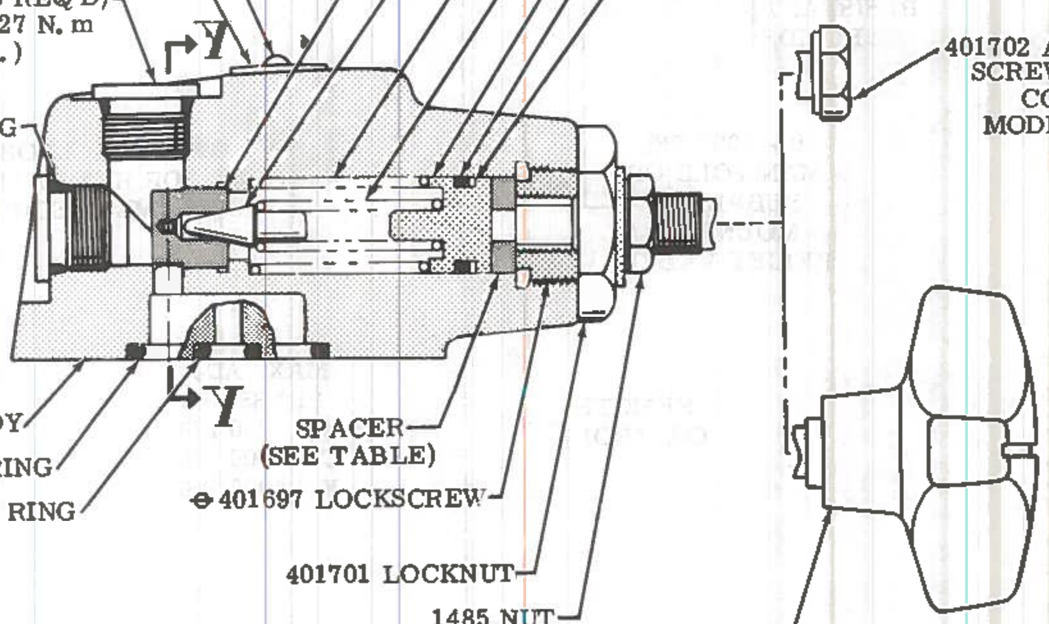
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

VICKERS®
A TRINOVA COMPANY

REMOTE CONTROL RELIEF VALVES (F3)CGR-02-*-(K)-30



MODEL	MAX. ADJ. PRESSURE	SPRING	SPACER
CGR-02-B-(K)-30	1000 PSI	2280	———
CGR-02-C-(K)-30	2000 PSI	583937	
CGR-02-F-(K)-30	3000 PSI	401700	386715

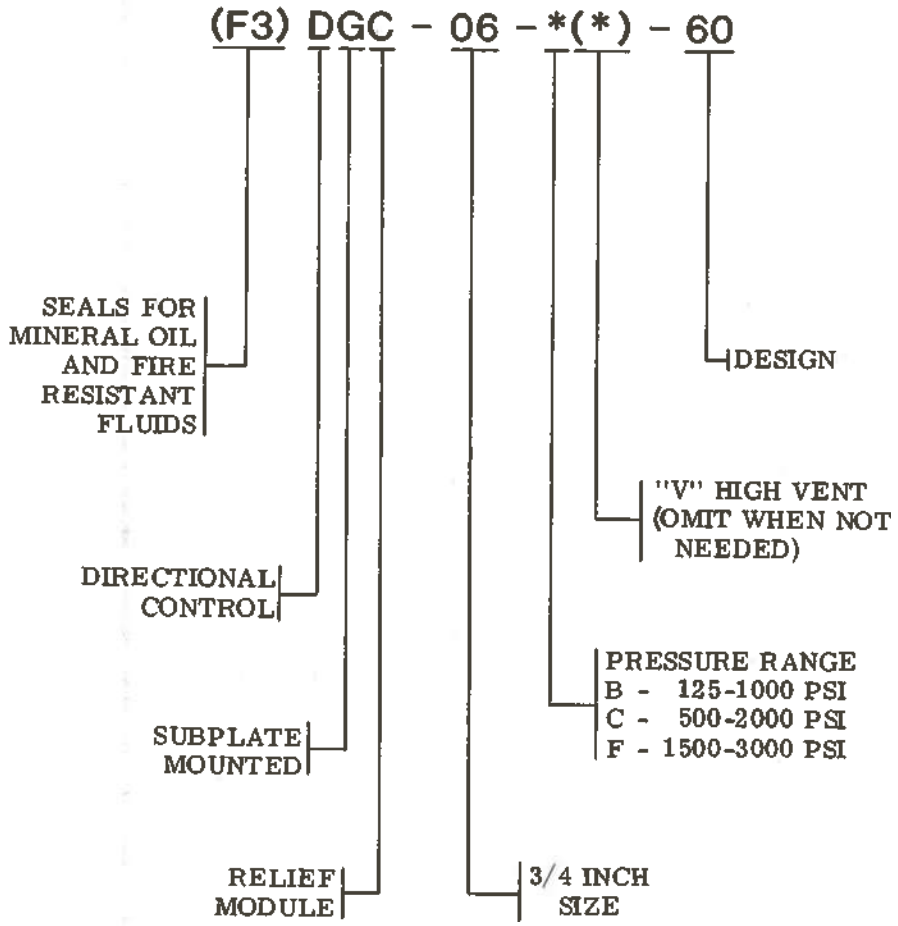
NOTE
ASSEMBLE 580427 SEAT WITH CROSS HOLE IN POSITION SHOWN OR 180° FROM POSITION SHOWN.

⊖INSTALL LOCKSCREW WITH STEPPED O.D. END TOWARD SPACER OR PLUNGER AS SHOWN.

▲SERVICE ALL UNITS W/F3 SEAL KIT 919854

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN



To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

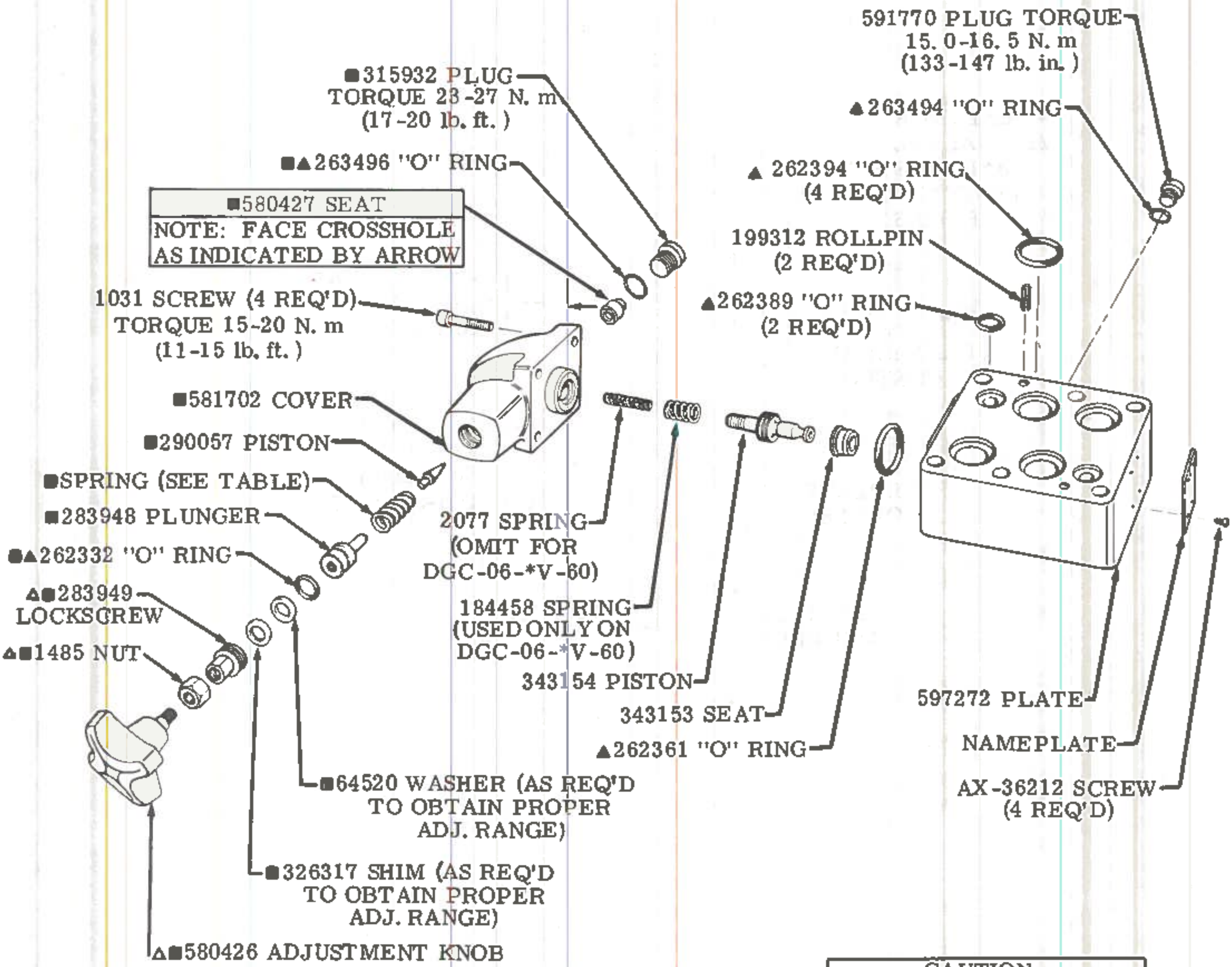
Litho in U. S. A.

Service Parts Information

VICKERS®
A TRINOVA COMPANY

MODULAR RELIEF VALVES

(F3)DGC-06-*(*)-60



CAUTION
THIS MODEL CANNOT BE USED WITH PRESSURE CENTERED (D) VALVES.

▲SERVICE ALL UNITS W/F3 SEAL KIT 919655

△COAT WITH OIL PRIOR TO ASSEMBLY

MODEL	■INCLUDED IN COVER S/A	■SPRING
DGC-06-B*-60	941280	2280
DGC-06-C*-60	941281	583937
DGC-06-F*-60	941282	2281

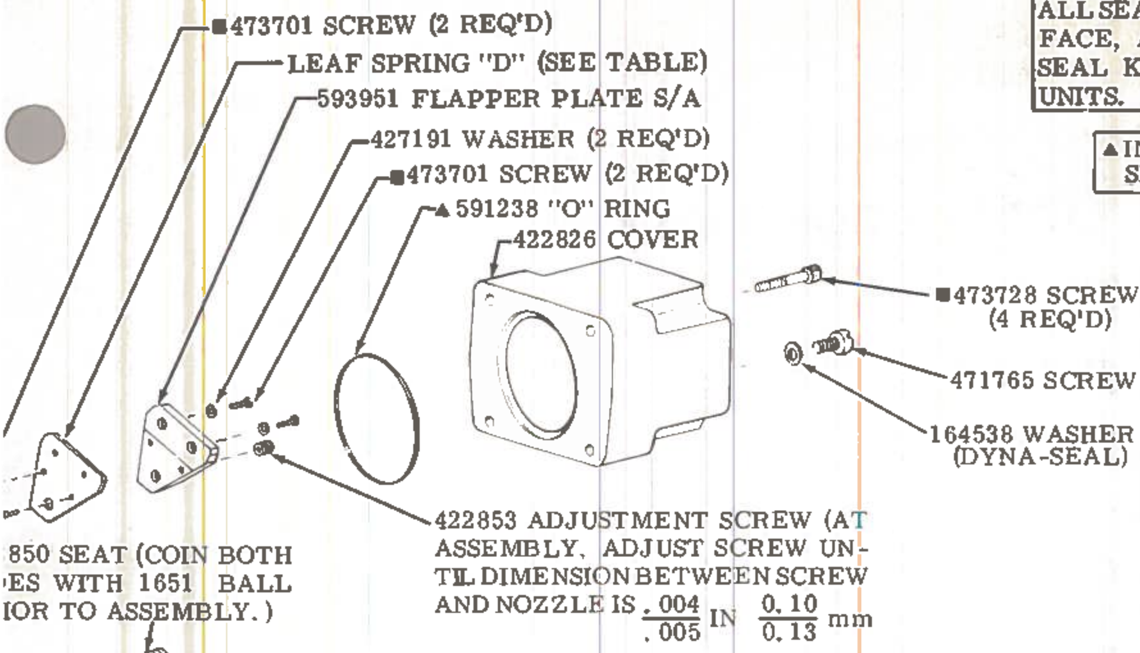
Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

(F3) - C G E - 10 - 3 (V) - 21 - (S6)

- **(F3)** — SEALS FOR MINERAL OIL OR FIRE RESISTANT FLUIDS
- **C** — RELIEF VALVE
- **G** — SUBPLATE MOUNTED
- **E** — REMOTE ELECTRICALLY MODULATED
- **10** — VALVE SIZE 10-100 SERIES (1 ¼" NOM.)
- **3** — PRESSURE RATING (PSI)
  - 1 - 75-1000 (70 bar)
  - 3 - 150-3000 (210 bar)
  - 3V - 300-3000 (210 bar)
- **(V)** — "V" - OPTIONAL HIGH VENTING PRESSURE FEATURE. OMIT IF NOT REQUIRED. (FOR 3000 PSI (210 bar) PRESSURE MODELS ONLY)
- **21** — DESIGN
- **(S6)** — S6 - EXTERNAL 35 MICRON PILOT FILTER (FURNISHED BY CUSTOMER

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.



ALL SEALS, EXCEPT INTERFACE, ARE F3. USE THE F3 SEAL KIT TO SERVICE ALL UNITS.

▲INCLUDED IN F3 SEAL KIT 920082

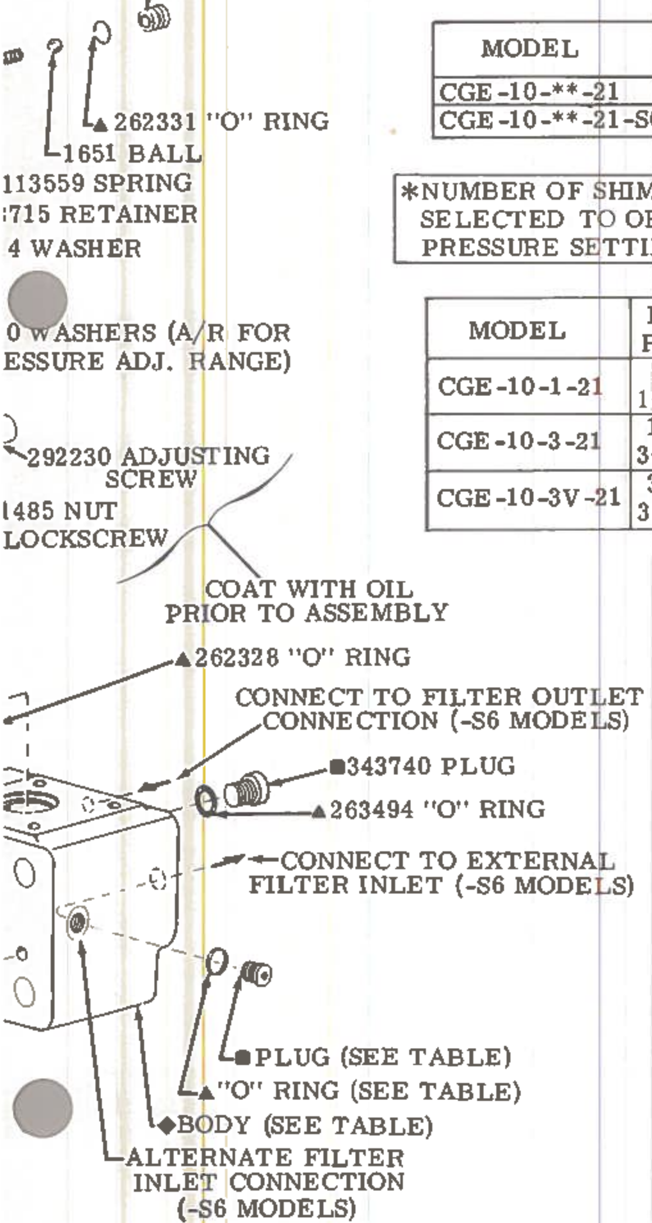
◆NOT AVAILABLE FOR SALE

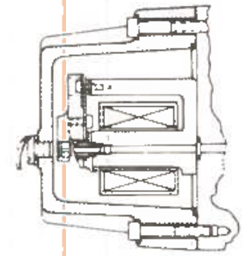
MODEL	◆BODY	▲ "O" RING	■ PLUG	EXTERNAL 3000 PSI 35 MICRON FILTER REQ'D
CGE-10-**-21	597719	———	———	NO
CGE-10-**-21-S6	597832	263494	343740	YES

*NUMBER OF SHIMS ARE FACTORY SELECTED TO OBTAIN MAXIMUM PRESSURE SETTING.

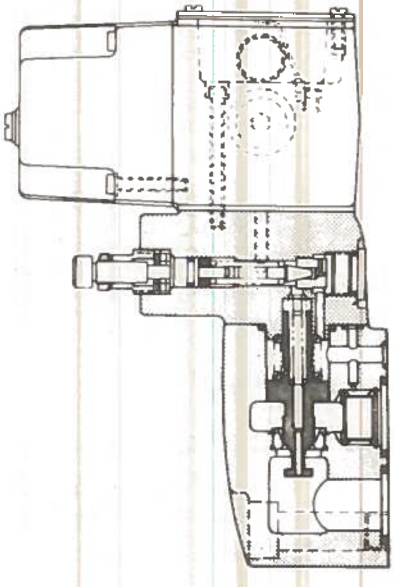
424189 NOZZLE (TORQUE TO 11 - 13 lb. in.) (1.2 - 1.5 N. m)
422842 NOZZLE (TORQUE TO 13 - 15 lb. in.) (1.5 - 1.7 N. m)

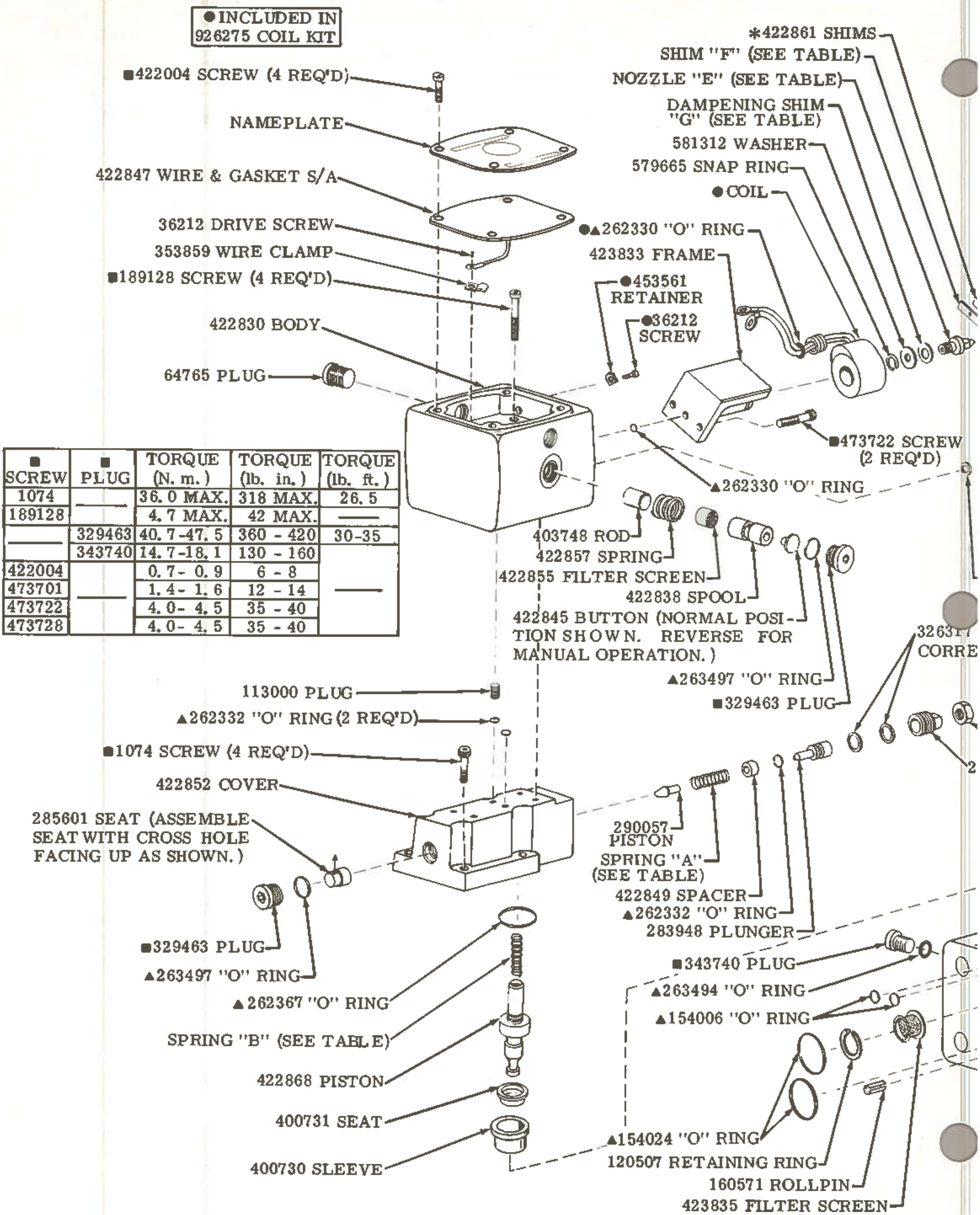
MODEL	PRESS. RANGE	SPRING "A"	SPRING "B"	LEAF SPRING "D"	NOZZLE "E"	SHIM "F"	DAMPING SHIM "G"
CGE-10-1-21	75 TO 1000 PSI	2280	424202	424188	424189	424190	424724
CGE-10-3-21	150 TO 3000 PSI	2281	424731	422835	422842	422839	———
CGE-10-3V-21	300 TO 3000 PSI	2281	291821	422835	422842	422839	———





45° CROSS SECTIONAL VIEW OF NOZZLE, FLAPPER AND COIL.





■ SCREW	■ PLUG	TORQUE (N. m.)	TORQUE (lb. in.)	TORQUE (lb. ft.)
1074	—	36.0 MAX.	318 MAX.	26.5
189128		4.7 MAX.	42 MAX.	—
—	329463	40.7-47.5	360 - 420	30-35
	343740	14.7-18.1	130 - 160	
422004		0.7- 0.9	6 - 8	
473701	—	1.4- 1.6	12 - 14	—
473722		4.0- 4.5	35 - 40	
473728		4.0- 4.5	35 - 40	

VICKERS®
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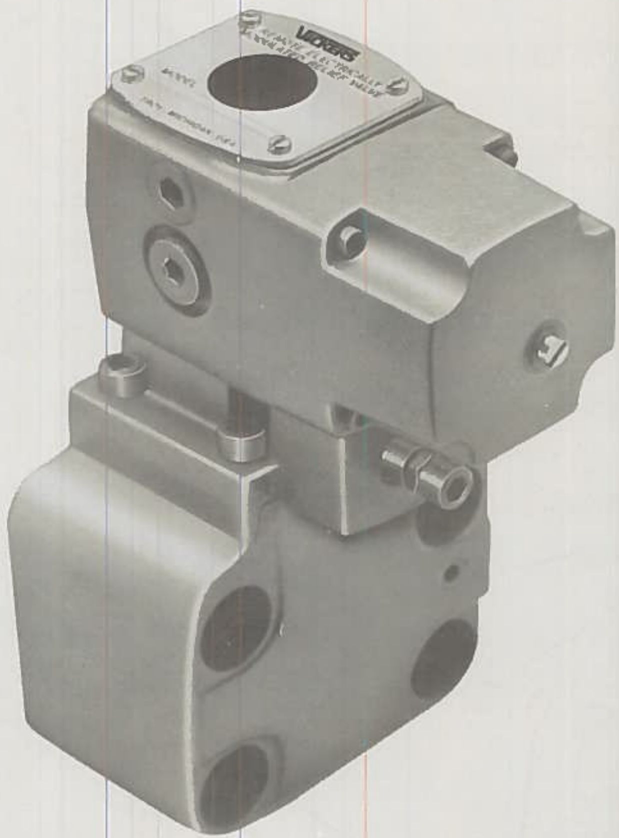
Service Parts Information

Remote Electrically Modulated Relief Valve

CGE-10-1-21-(S6)
CGE-10-3(V)-21-(S6)



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 12-1-87 **I-3676-S**

MODEL CODE BREAKDOWN

(F3) - C G E - 06 - 3 (V) - 21 - S*

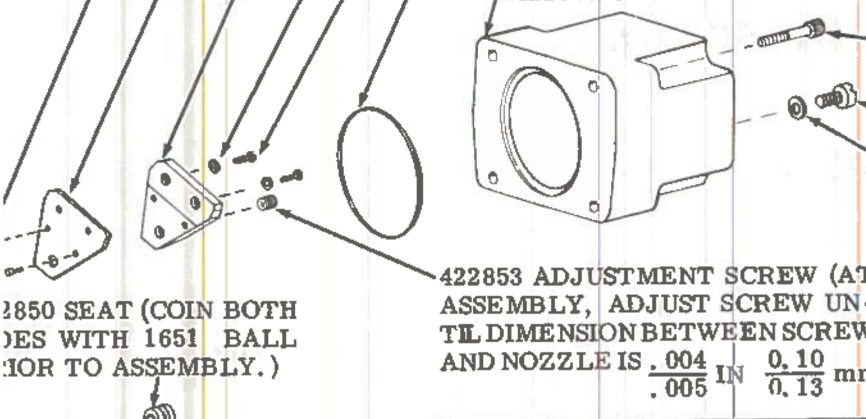
- **(F3)** – SEALS FOR MINERAL OIL OR FIRE RESISTANT FLUIDS
- **C** – RELIEF VALVE
- **G** – SUBPLATE MOUNTED
- **E** – REMOTE ELECTRICALLY MODULATED
- **06** – VALVE SIZE 06-60 SERIES (3/4" NOM.)
- **3** – PRESSURE RATING (PSI)
  - 1 - 75 - 1000 (70 bar)
  - 3 - 150 - 3000 (210 bar)
  - 3V - 300 - 3000 (210 bar)
- **(V)** – "V" - OPTIONAL HIGH VENTING PRESSURE FEATURE. OMIT IF NOT REQUIRED. (FOR 3000 PSI (210 bar) PRESSURE MODELS ONLY)
- **21** – DESIGN
- **S*** –
  - S6 - EXTERNAL 35 MICRON PILOT FILTER (FURNISHED BY CUSTOMER)
  - S7 - VITON SEALS WITH 35 MICRON FILTER (EARLY MODELS)

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

ALL SEALS, EXCEPT INTERFACE, ARE F3. USE THE F3 SEAL KIT TO SERVICE ALL UNITS.

▲INCLUDED IN F3 SEAL KIT 920081



◆NOT AVAILABLE FOR SALE

MODEL	◆BODY	▲ "O" RING	■ PLUG	EXTERNAL 3000 PSI 35 MICRON FILTER REQ'D
CGE-06-**-21	597718	———	———	NO
CGE-06-**-21-S6	597831	263494	343740	YES

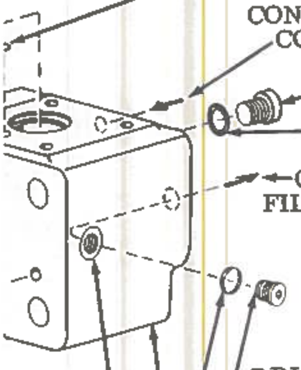
*NUMBER OF SHIMS ARE FACTORY SELECTED TO OBTAIN MAXIMUM PRESSURE SETTING.

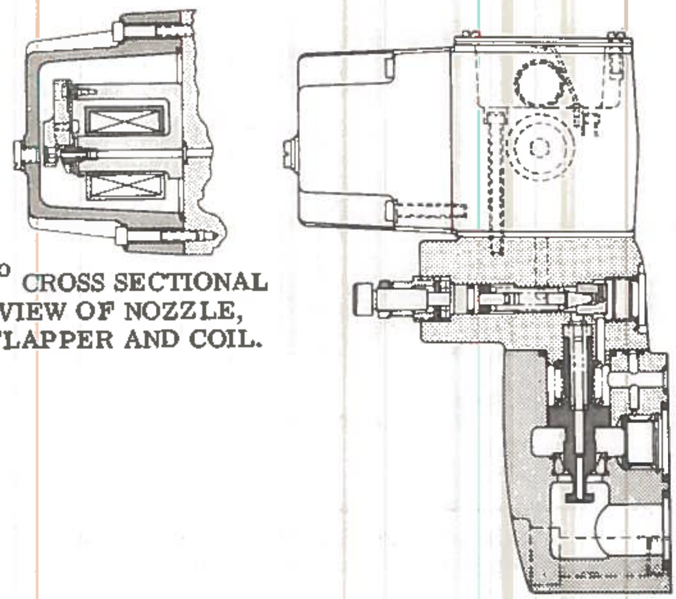
424189 NOZZLE (TORQUE TO 11 - 13 lb. in.) (1.2 - 1.5 N. m)

422842 NOZZLE (TORQUE TO 13 - 15 lb. in.) (1.5 - 1.7 N. m)

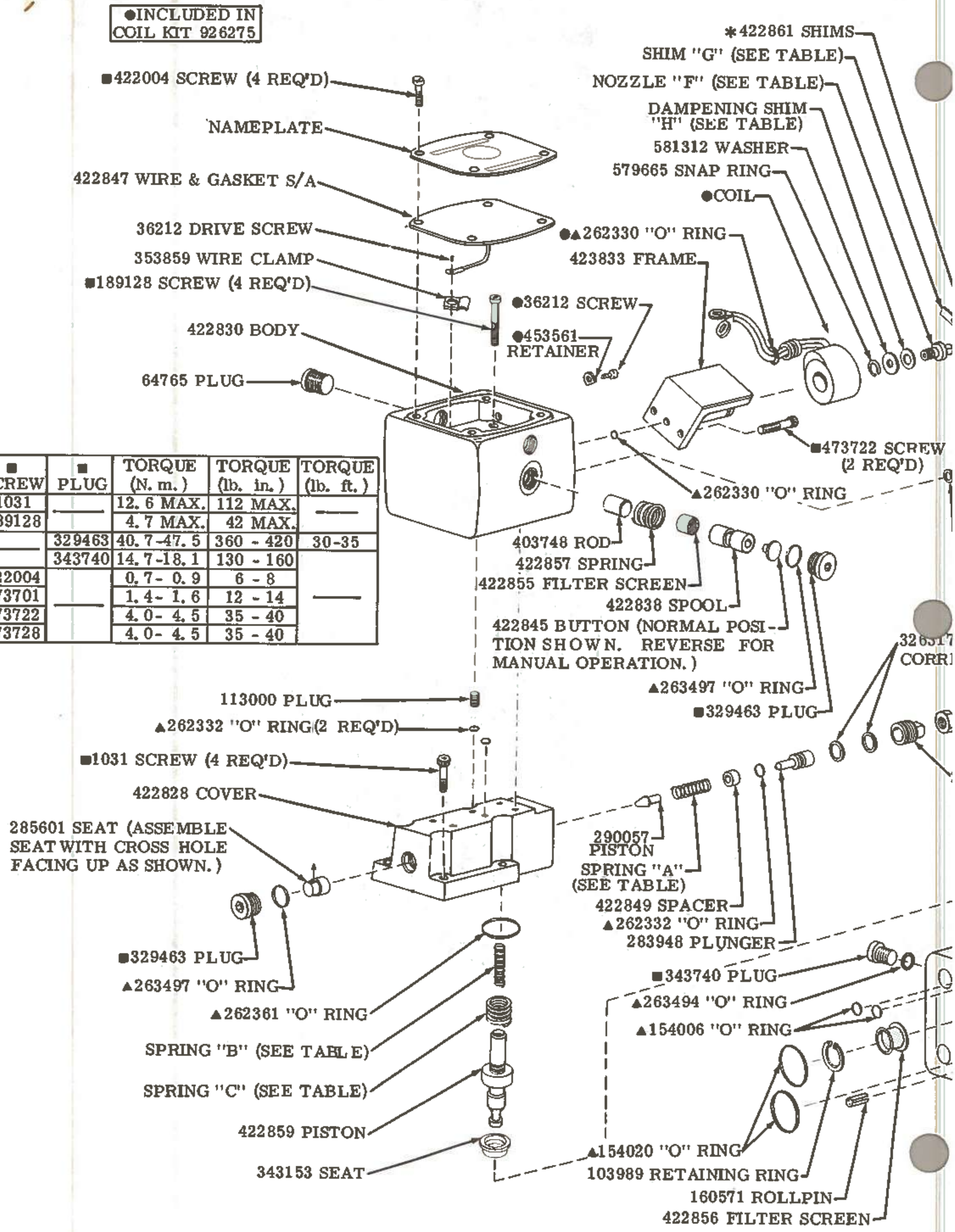
MODEL	PRESS. RANGE	SPRING "A"	SPRING "B"	SPRING "C"	LEAF SPRING "E"	NOZZLE "F"	SHIM "G"	DAMPING SHIM "H"
CGE-06-1-21	75 TO 1000 PSI	2280	2077	———	424188	424189	424190	424724
CGE-06-3-21	150 TO 3000 PSI	2281	2077	———	422835	422842	422839	———
CGE-06-3V-21	300 TO 3000 PSI	2281	———	184458	422835	422842	422839	———

20 WASHERS (A/R FOR RESSURE ADJ. RANGE)





45° CROSS SECTIONAL VIEW OF NOZZLE, FLAPPER AND COIL.



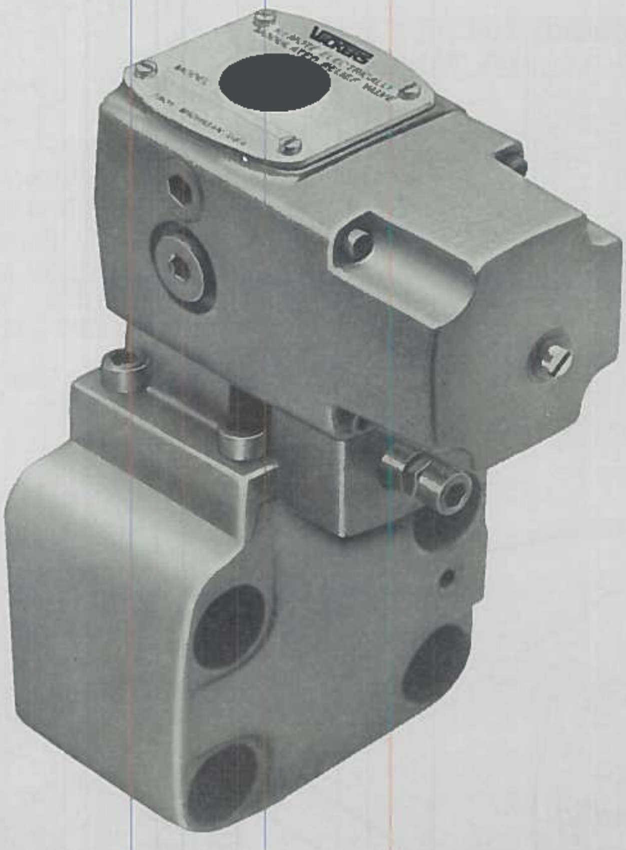
■ SCREW	■ PLUG	TORQUE (N. m.)	TORQUE (lb. in.)	TORQUE (lb. ft.)
1031	—	12.6 MAX.	112 MAX.	—
189128		4.7 MAX.	42 MAX.	
—	329463	40.7-47.5	360 - 420	30-35
	343740	14.7-18.1	130 - 160	—
422004	—	0.7- 0.9	6 - 8	
473701		1.4- 1.6	12 - 14	
473722		4.0- 4.5	35 - 40	
473728		4.0- 4.5	35 - 40	

VICKERS®
A TRINOVA COMPANY

Service Parts Information

Remote Electrically Modulated Relief Valves

CGE-06-1-21
CGE-06-3(V)-21-(S6)(S7)



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 12-1-87 **I-3675-S**

MODEL CODE BREAKDOWN

(F3)-CG-(H)-*(V)-(P)(*)DG(L)-8C-(H)-(*)-20**

- (F3) — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- C — RELIEF VALVE
- G — MANIFOLD OR SUBPLATE MOUNTED
- (H) — HIGH FLOW
- ** — NOMINAL SIZE
  - 06 - 3/4"
  - 10 - 1¼"
- * — PRESSURE RANGE PSI (FOR HEAD #1, #2, & #3)
  - B - 125 - 1000 PSI
  - C - 500 - 2000 PSI
  - F - 1500 - 3000 PSI
  - E - VENT
- (V) — V - HIGH VENT SPRING; OMIT - LOW VENT SPRING
- (P) — P - INSTA PLUG FEATURE; OMIT - NOT REQUIRED
- (*) — A - WITH PLUG ONLY; B - WITH PLUG AND RECEPTACLE; OMIT - NOT REQUIRED
- D — DIRECTIONAL VALVE PILOT STAGE
- G — MANIFOLD OR SUBPLATE MOUNTED
- (L) — L - SOLENOID INDICATOR LIGHTS; OMIT - WITHOUT LIGHTS
- 8 — 8 - TANDEM OPEN CENTER CROSSOVER SPOOL
- C — C - SPRING CENTERED PILOT
- (H) — H - OIL IMMERSED SOLENOID; OMIT - STANDARD SOLENOID
- (*) — SOLENOID VOLTAGE (OMIT FOR STD. 115AC60)
- 20 — DESIGN

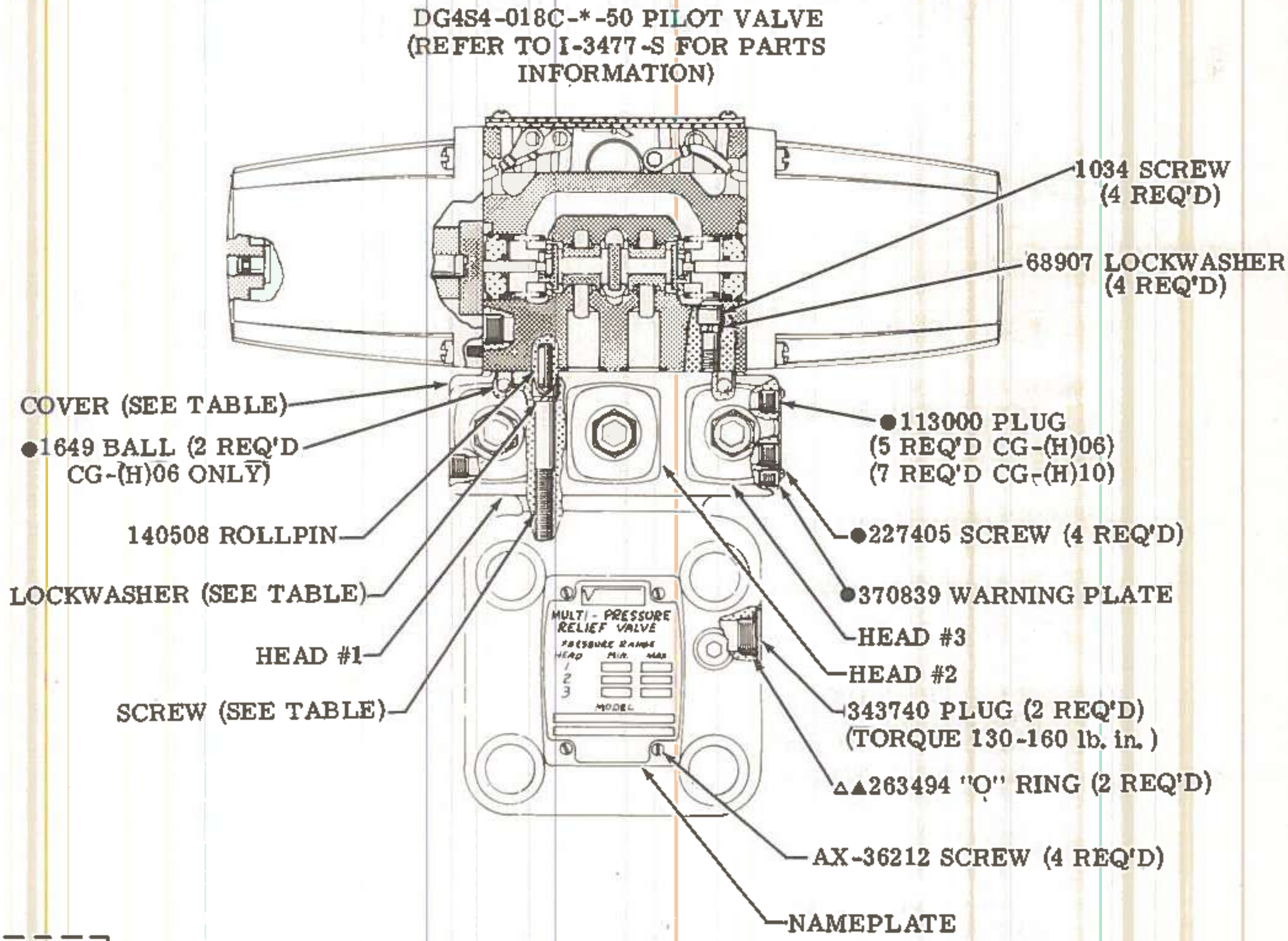
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

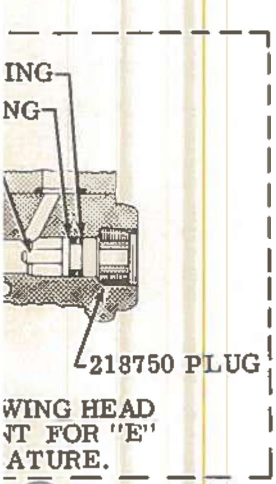
INSTA-PLUG CONNECTORS FOR DG4S4 PILOT STAGE ARE SHOWN ON DRAWING I-3487-S.

OIL IMMERSED SOLENOID INFORMATION IS SHOWN ON DRAWING I-3498-S.

WARNING
DO NOT USE OTHER THAN A DG4S4-018C-*-50 DIRECTIONAL VALVE AS THE PILOT FOR THIS RELIEF VALVE. USE OF A DIFFERENT PILOT CAN BLOCK THE RELIEF VALVE CAUSING EXCESSIVE SYSTEM PRESSURE.

ED IN
ASSY





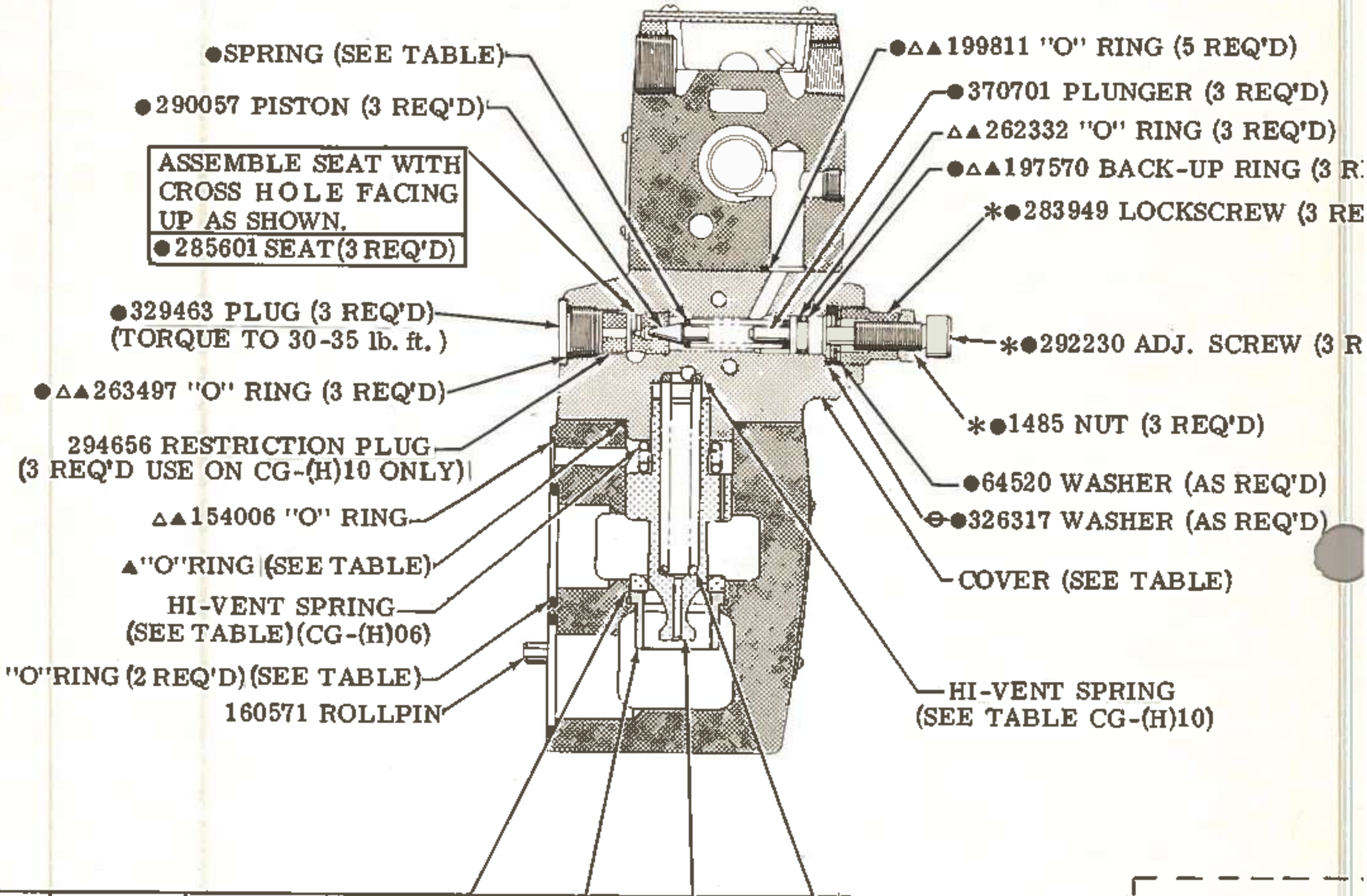
MODEL	SCREW (4 REQ'D)	LOCKWASHER (4 REQ'D)
CG-(H)06	1036	68907
CG-(H)10	1076	68909

▲INCLUDED IN (F3)CG-(H)06 SEAL KIT 919684

△INCLUDED IN (F3)CG-(H)10 SEAL KIT 919685

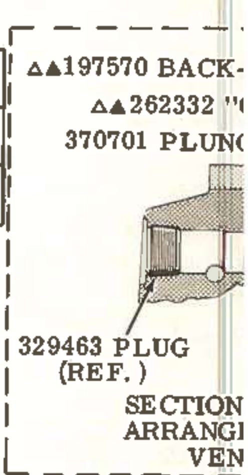
ALL SEALS, EXCEPT DIRECTIONAL VALVE & RELIEF VALVE INTERFACE SEALS, ARE F3. USE F3 SEAL KIT TO SERVICE ALL UNITS.

MODEL	HEAD #1		HEAD #2		HEAD #3		●CG-(H)06 COVER S/A
	● SPRING	PRESSURE RANGE PSI	● SPRING	PRESSURE RANGE PSI	● SPRING	PRESSURE RANGE PSI	
CG-(H)06/(H)10-CBF	583937	500 - 2000	2280	125 - 1000	2281	1500 - 3000	942198
CG-(H)06/(H)10-CEB			VENT	——	2280	125 - 1000	——
CG-(H)06/(H)10-CBC			2280	125 - 1000	583937	500 - 2000	942202
CG-(H)06/(H)10-FFB	2281	1500 - 3000	2281	1500 - 3000	2280	125 - 1000	942326



MODEL	"O" RING	"O" RING (2 REQ'D)	BODY	SEAT	SLEEVE	HYDRO CONE	LO-VENT SPRING	HI-VENT SPRING	● COVER
CG-06	●▲262361	▲154020	580456	343153	——	343154	2077	184458	370664
CG-H06				589473	589472				
CG-10	●△262367	△154024	581703	283954	——	283952	291822	291821	370669
CG-H10				587996	400730				

USE EITHER A LO-VENT OR HI-VENT SPRING AS SHOWN. DO NOT USE BOTH.



⊖THIS PART USED AT FINAL TEST TO OBTAIN CORRECT PRESSURE RANGE.

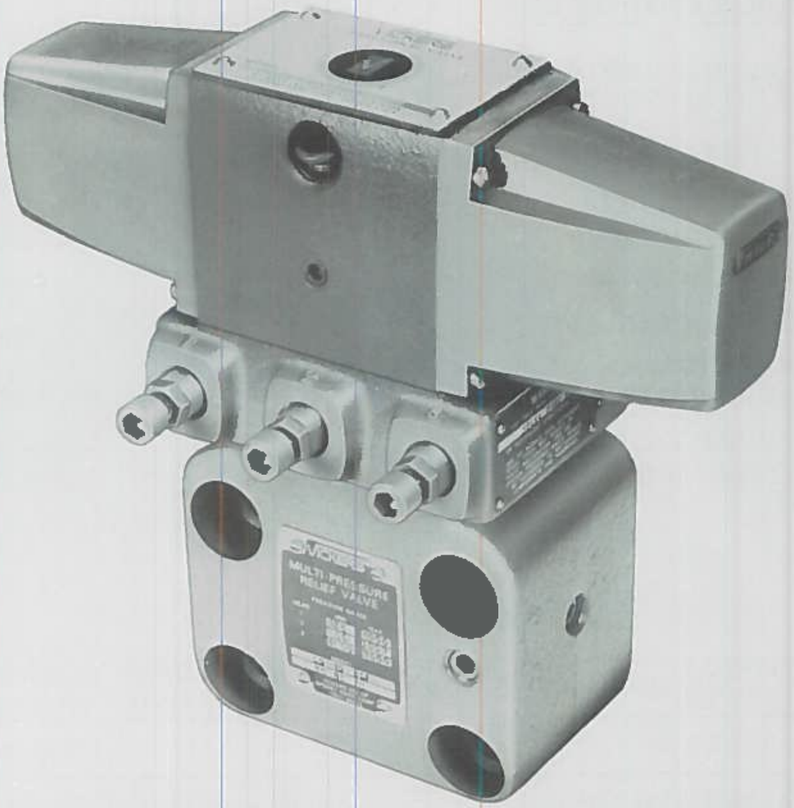
*NOTE
COAT 292230 ADJ. SCREW, 283949 LOCK SCREW, AND 1485 LOCKNUT WITH OIL PRIOR TO ASSEMBLY.

VICKERS®
A TRINOVA COMPANY

Service Parts Information

Multi-Pressure Relief Valves

CG-(H)-06-*(V)-(P)(*)DG(L)-8C-(H)-(*)-20
CG-(H)-10-*(V)-(P)(*)DG(L)-8C-(H)-(*)-20



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

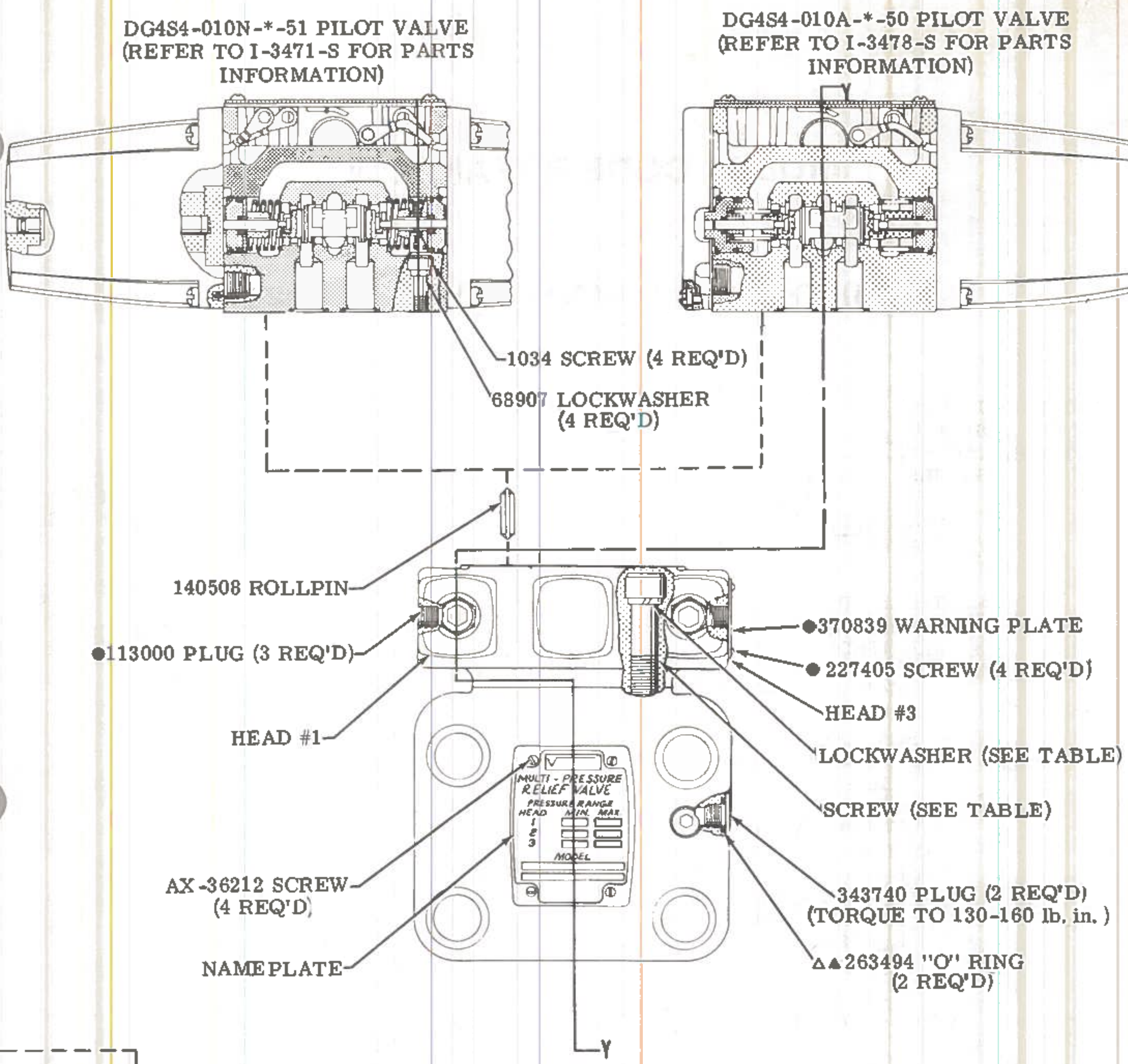
Revised 12-1-87 I-3684-S

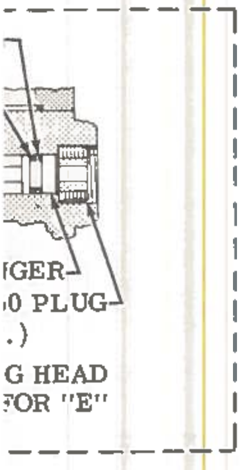
MODEL CODE BREAKDOWN

(F3)CG-(H)-*(V)-(P)*DG(L)-0*-(H)-*-20**

- (F3) — SPECIAL SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- C — RELIEF VALVE
- G — MANIFOLD OR SUBPLATE MOUNTED
- (H) — HIGH FLOW
- ** — NOMINAL SIZE
  - 06 - 3/4"
  - 10 - 1¼"
- * — PRESSURE RANGE PSI (FOR HEADS 1 OR 3)
  - B - 125 - 1000
  - C - 500 - 2000
  - F - 1500 - 3000
  - E - VENT
- (V)
  - V - HI-VENT SPRING
  - OMIT - LOW VENT SPRING
- (P)
  - P - INSTA-PLUG FEATURE
  - OMIT - NOT REQUIRED
- *
  - A - WITH PLUG ONLY
  - B - W/PLUG & RECEPTACLE
  - OMIT - NOT REQUIRED
- D — DIRECTIONAL VALVE PILOT STAGE
- G — MANIFOLD OR SUBPLATE MOUNTED
- (L)
  - L - SOLENOID INDICATOR LIGHT
  - OMIT - WITHOUT LIGHTS
- 0 — 0 - OPEN CENTERED SPOOL
- *
  - N - NO SPRING DETENT PILOT STAGE
  - A - OFFSET PILOT STAGE
- (H)
  - H - OIL IMMERSED SOLENOID
  - OMIT - STD. SOLENOID
- * — SOLENOID VOLTAGE OMIT FOR STD 115AC60
- 20 — DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.





MODEL	SCREW (4 REQ'D)	LOCKWASHER (4 REQ'D)
CG-(H)06	1036	68907
CG-(H)10	1076	68909

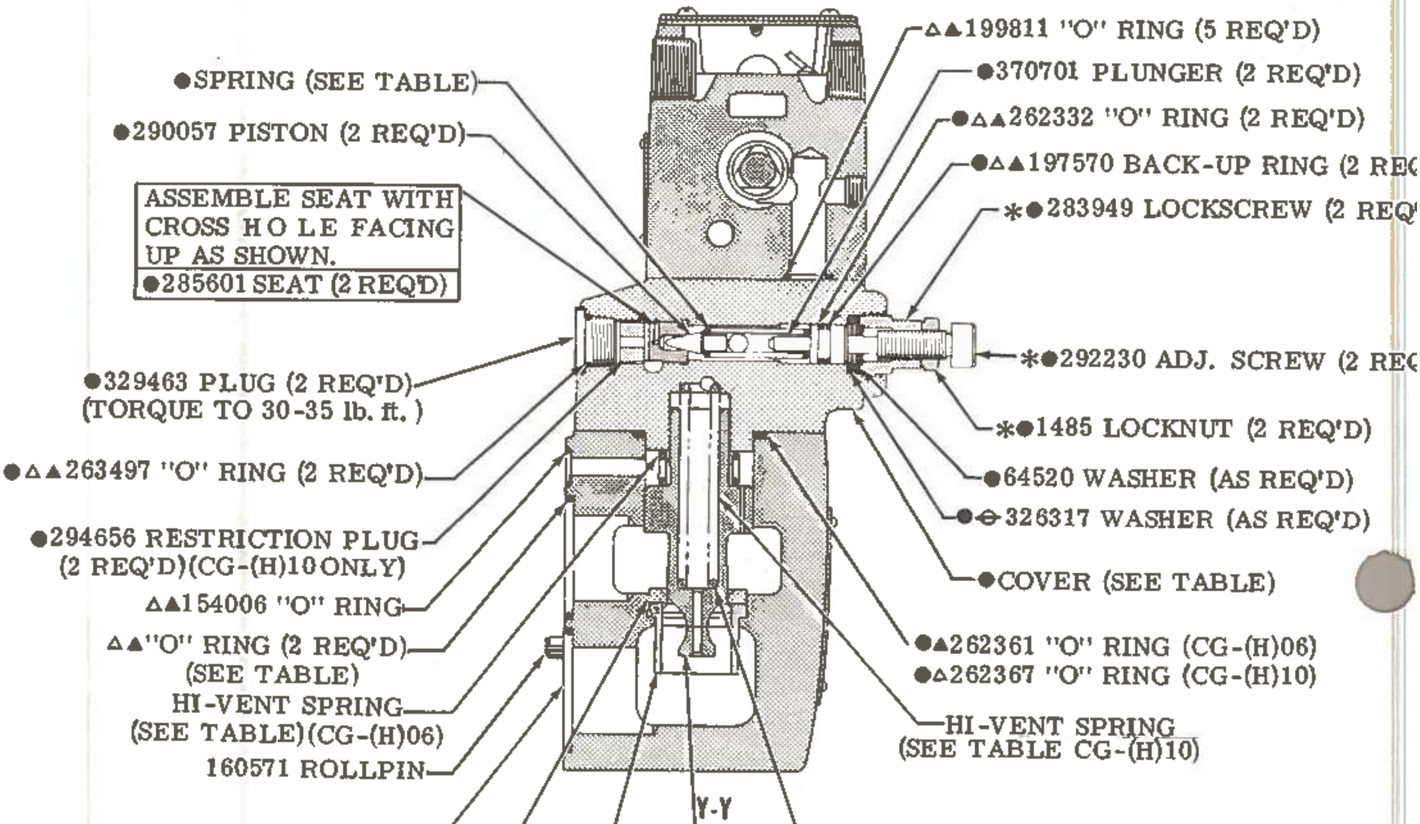
WARNING

DO NOT USE OTHER THAN A DG4S4-010A-*-50 OR A DG4S4-010N-*-51 DIRECTIONAL VALVE AS THE PILOT FOR THIS RELIEF VALVE. USE OF A DIFFERENT PILOT CAN BLOCK THE RELIEF VALVE, CAUSING EXCESSIVE SYSTEM PRESSURE.

INSTA-PLUG CONNECTORS FOR THE DG4S4 PILOT STAGE ARE SHOWN ON PARTS DRAWING I-3487-S.

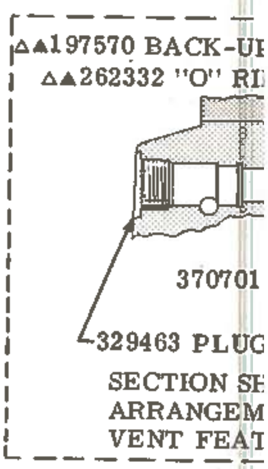
MODEL	HEAD #1		HEAD #3		●CG-(H)06 COVER S/A	●CG-(H)10 COVER S/A
	SPRING	PRESSURE RANGE PSI	SPRING	PRESSURE RANGE PSI		
CG-(H)06/(H)10-BC	2280	125 - 1000	583937	500 - 2000	942155	942156
CG-(H)06/(H)10-BF	2280	125 - 1000	2281	1500 - 3000	———	———
CG-(H)06/(H)10-CF	583937	500 - 2000	2281	1500 - 3000	———	———

●INCLUDED IN COVER SUBASSY



MODEL	"O" RING (2 REQ'D)	BODY	SEAT	SLEEVE	HYDRO CONE	LO-VENT SPRING	HI-VENT SPRING	COVER
CG-06	▲154020	580456	343153	———	343154	2077	184458	370666
CG-H06	▲154020	580456	589473	589472	343154	2077	184458	370666
CG-10	△154024	581703	283954	———	283952	291822	291821	370671
CG-H10	△154024	581703	587996	400730	283952	291822	291821	370671

USE EITHER A LO-VENT OR HI-VENT SPRING AS SHOWN. DO NOT USE BOTH.



*NOTE
COAT 292230 ADJ. SCREW, 283949 LOCK SCREW, AND 1485 LOCKNUT WITH OIL PRIOR TO ASSEMBLY.

▲ INCLUDED IN F3CG-(H)06 SEAL KIT 919684

△ INCLUDED IN F3CG-(H)10 SEAL KIT 919685

⊖THIS PART USED AT FINAL TEST TO OBTAIN CORRECT PRESSURE RANGE

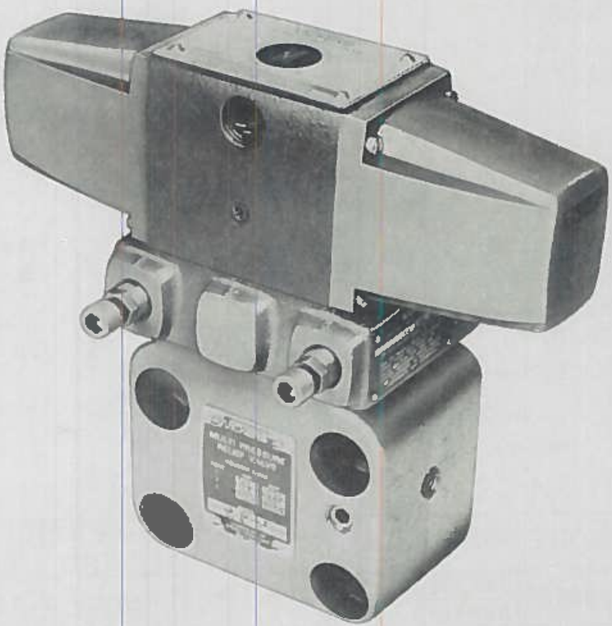
ALL SEALS, EXCEPT DIRECTIONAL VALVE & RELIEF VALVE INTERFACE SEALS, ARE F3. USE F3 SEAL KIT TO SERVICE ALL UNITS.

VICKERS®
A TRINOVA COMPANY

Service Parts Information

**Multi-
Pressure
Relief
Valves**

CG-(H)-06-*(V)-(P)*DG(L)-0*-(H)-*-20
CG-(H)-10-*(V)-(P)*DG(L)-0*-(H)-*-20



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007–0302

Revised 11-1-85 **I-3685-S**

MODEL CODE BREAKDOWN

(F3)-C*-(H)-*(V)-(P)(*)DG(L)-(8)C-(H)-(*)-20**

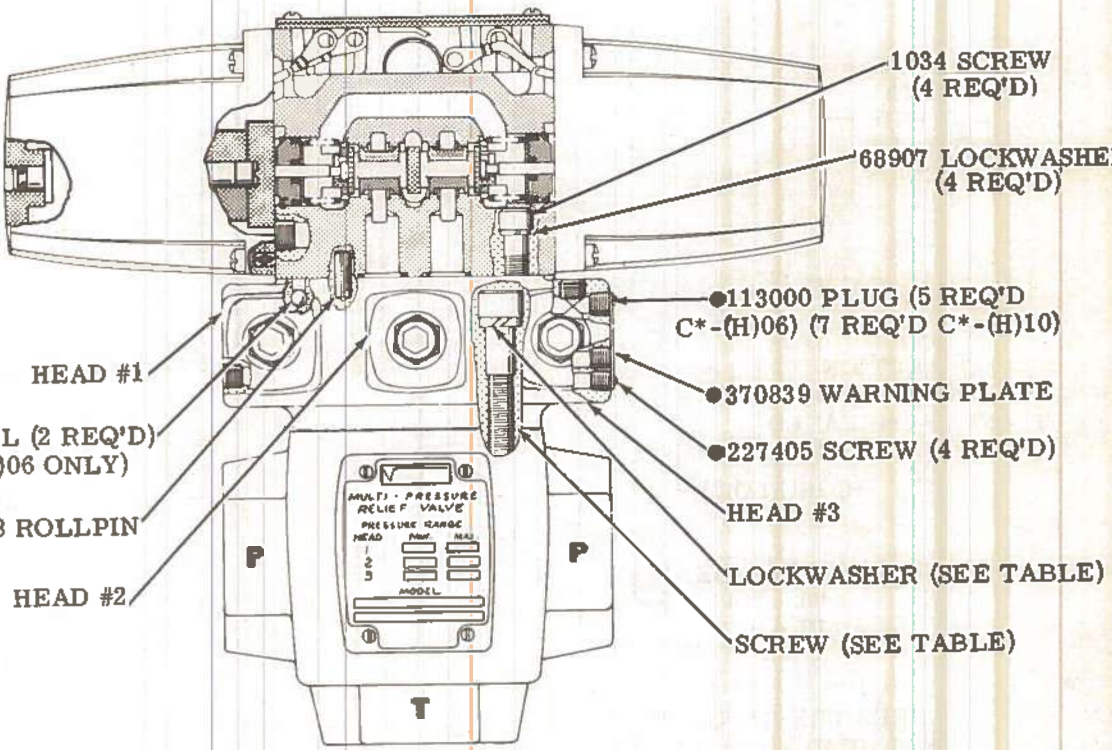
- (F3) — SPECIAL SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- C — RELIEF VALVE
- * — CONNECTION
  S - STR. THREAD
  T - NPTF THREADED
- (H) — HIGH FLOW
- ** — NOMINAL SIZE
  06 - 3/4"
  10 - 1¼"
- * — PRESSURE RANGE PSI (FOR HEAD #1, #2, OR #3)
  B - 125 - 1000
  C - 500 - 2000
  F - 1500 - 3000
  E - VENT
- (V) — V - HI-VENT SPRING
  OMIT - FOR LOW VENT SPRING
- (P) — P - INSTA-PLUG FEATURE (OMIT WHEN NOT REQ'D)
- (*) — A - WITH PLUG ONLY
  B - W/PLUG & RECEPTACLE
  (OMIT WHEN NOT REQ'D)
- D — DIRECTIONAL VALVE PILOT STAGE
- G — SUBPLATE OR MANIFOLD MOUNTED
- (L) — L - SOLENOID INDICATOR LIGHTS (OMIT WITHOUT LIGHTS)
- (8) — 8 - TANDEM OPEN CENTER CROSSOVER SPOOL
- C — C - SPRING CENTERED PILOT
- (H) — H - OIL IMMERSED SOLENOID (OMIT FOR STD. SOLENOID)
- (*) — SOLENOID VOLTAGE (OMIT FOR STD. 115 AC 60)
- 20 — DESIGN

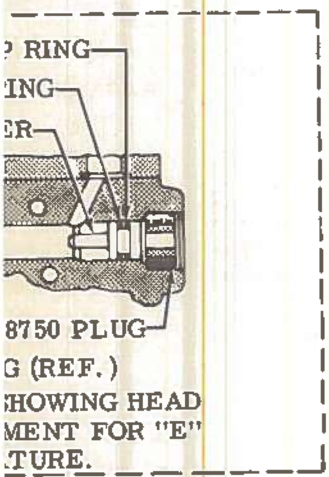
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

INSTA-PLUG CONNECTORS FOR DG4S4 PILOT STAGE ARE SHOWN ON DRAWING I-3487-S.

OIL IMMERSED SOLENOID INFORMATION IS SHOWN ON DRAWING I-3498-S.

WARNING
DO NOT USE OTHER THAN A DG4S4-018C-*-50 DIRECTIONAL VALVE AS THE PILOT FOR THIS RELIEF VALVE. USE OF A DIFFERENT PILOT CAN BLOCK THE RELIEF VALVE CAUSING EXCESSIVE SYSTEM PRESSURE.





MODEL	SCREW (4 REQ'D)	LOCKWASHER (4 REQ'D)
C*-(H)06	1036	68907
C*-(H)10	1076	68909

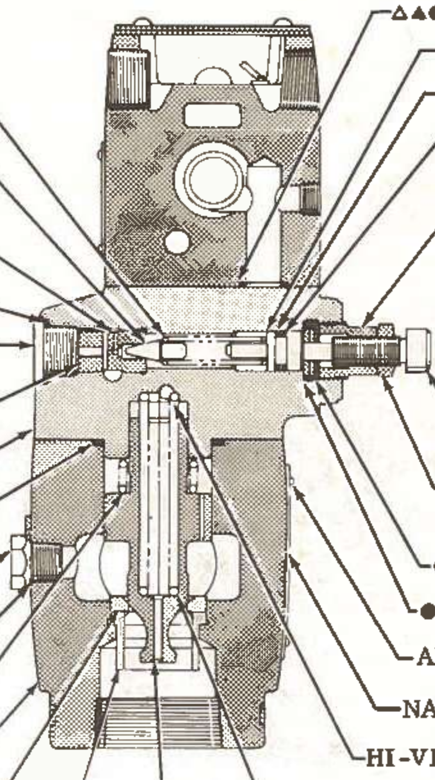
▲INCLUDED IN (F3)C*-(H)06 SEAL KIT 919684

△INCLUDED IN (F3)C*-(H)10 SEAL KIT 919685

ALL SEALS, EXCEPT DIRECTIONAL VALVE INTERFACE SEALS, ARE F3. USE F3 SEAL KIT TO SERVICE UNITS.

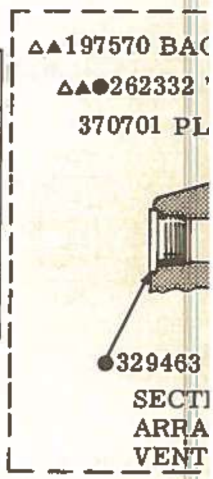
MODEL	HEAD #1		HEAD #2		HEAD #3		● CT-(H)06 COVER S/A
	● SPRING	PRESSURE RANGE PSI	● SPRING	PRESSURE RANGE PSI	● SPRING	PRESSURE RANGE PSI	
C*-(H)06/(H)10-CBF	583937	500-2000	2280	125-1000	2281	1500-3000	942198
C*-(H)06/(H)10-CEB			VENT	———	2280	125-1000	———
C*-(H)06/(H)10-CBC			2280	125-1000	583937	500-2000	942202
C*-(H)06/(H)10-FFB	2281	1500-3000	2281	1500-3000	2280	125-1000	942326

●INCLUDED IN COVER SUBASSY



MODEL	● "O" RING	BODY	SEAT	SLEEVE	HYDRO CONE	LO-VENT SPRING	HI-VENT SPRING	COVER
CS-06	▲262361	581701	343153	———	343154	2077	184458	370664
CS-H06			589473	589472				
CS-10	△262367	580430	283954	———	283952	291822	291821	370669
CS-H10			587996	400730				
CT-06	▲262361	590348	343153	———	343154	2077	184458	370664
CT-H06			589473	589472				
CT-10	△262367	590300	283954	———	283952	291822	291821	370669
CT-H10			587966	400730				

USE EITHER A LO-VENT OR HI-VENT SPRING AS SHOWN. DO NOT USE BOTH.



*NOTE
COAT 292230 ADJ. SCREW, 283949 LOCK SCREW, & 1485 LOCK NUT WITH OIL PRIOR TO ASSEMBLY.

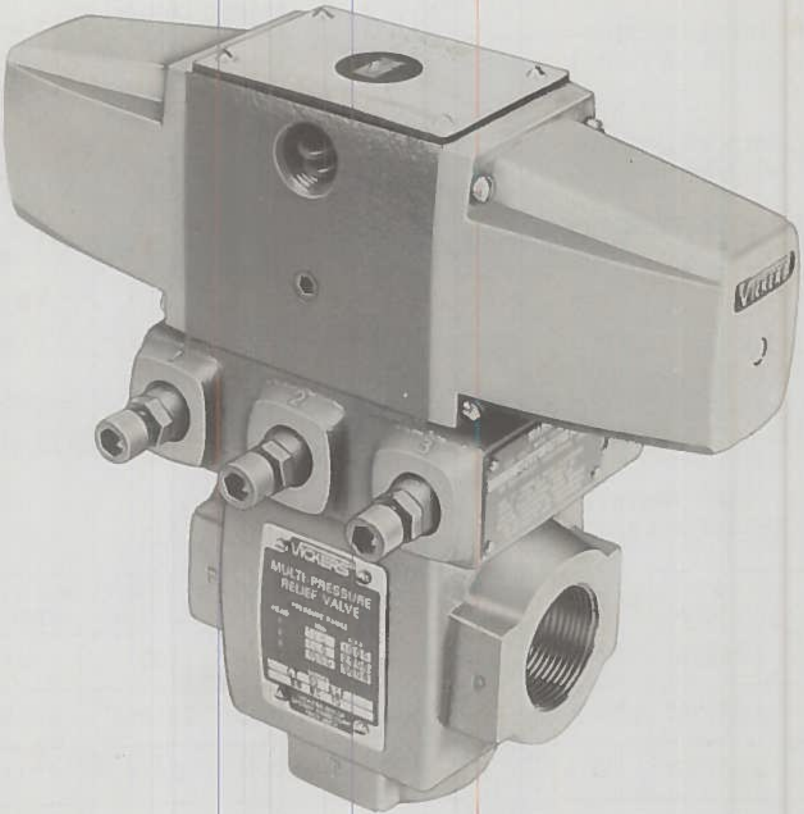
⊖THIS PART USED AT FINAL TEST TO OBTAIN CORRECT PRESSURE RANGE.

VICKERS®
A TRINOVA COMPANY

Service Parts Information

Multi-Pressure Relief Valves

CS/CT-(H)-06-*(V)-(P)(*)DG(L)-(8)C-(H)-(*)-20
CS/CT-(H)-10-*(V)-(P)(*)DG(L)-(8)C-(H)-(*)-20



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 11-1-85 **I-3686-S**

MODEL CODE BREAKDOWN

C - 175 - * - 20

- C — RELIEF VALVE
- 175 — SERIES
- * — PRESSURE RANGE (PSI)
  - B - 75-1000
  - C - 500-2000
  - F - 1500-3000
- 20 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

VICKERS®
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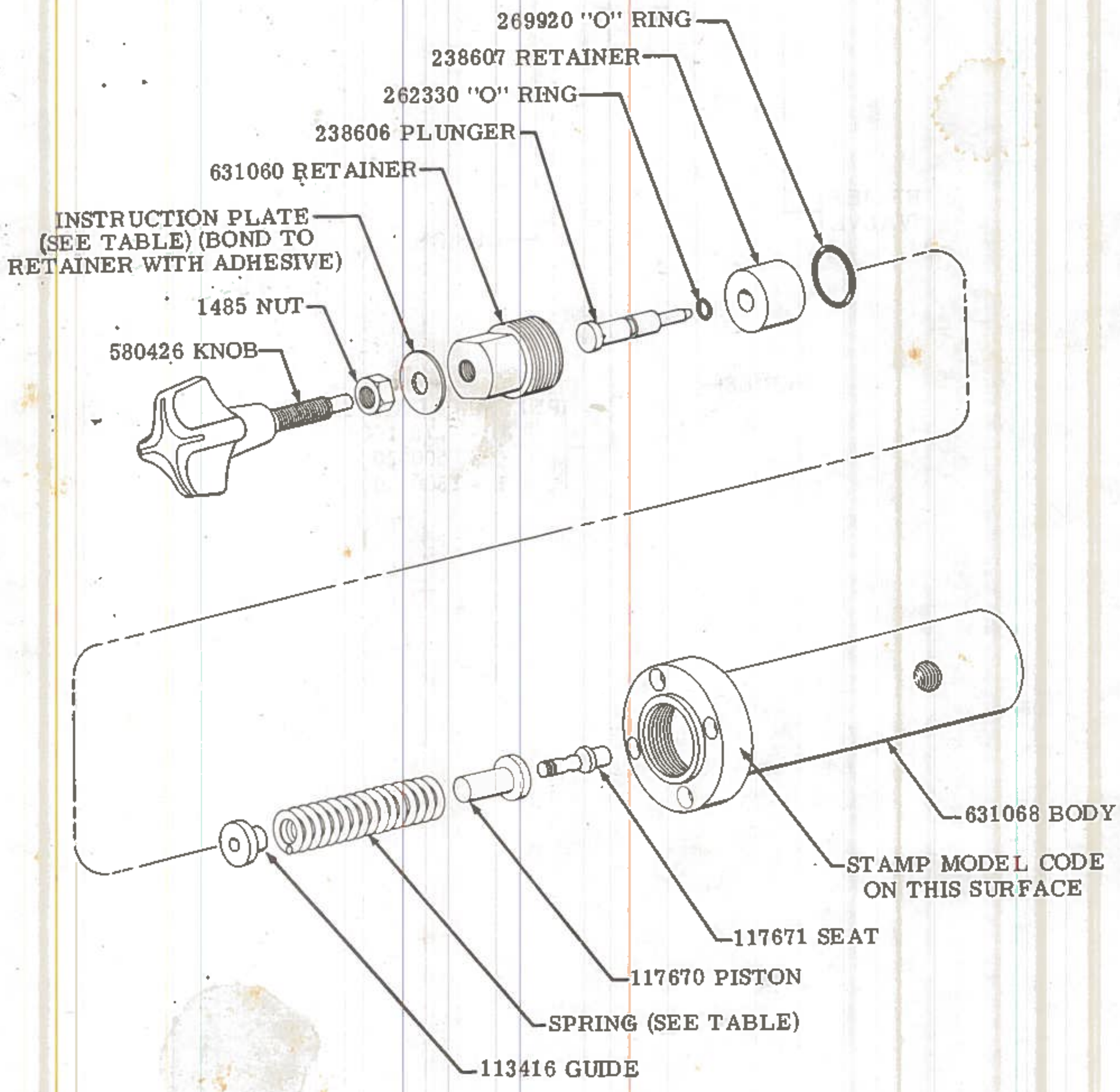
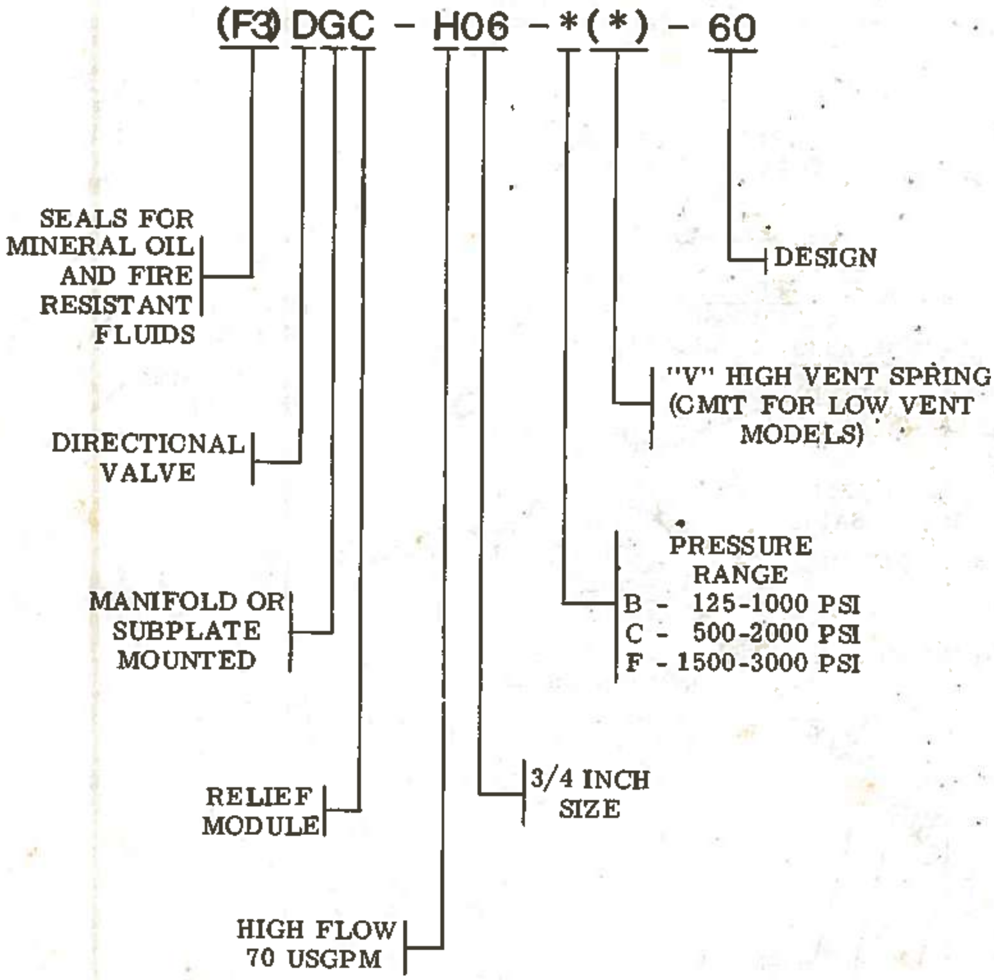
REMOTE CONTROL PRESSURE RELIEF VALVES

C-175-*-20



MODEL	SPRING	PRESSURE RANGE	INSTRUCTION PLATE
C-175-B-20	152609	75 - 1000	631057
C-175-C-20	152610	500 - 2000	631058
C-175-F-20	135007	1500 - 3000	631059

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

VICKERS®
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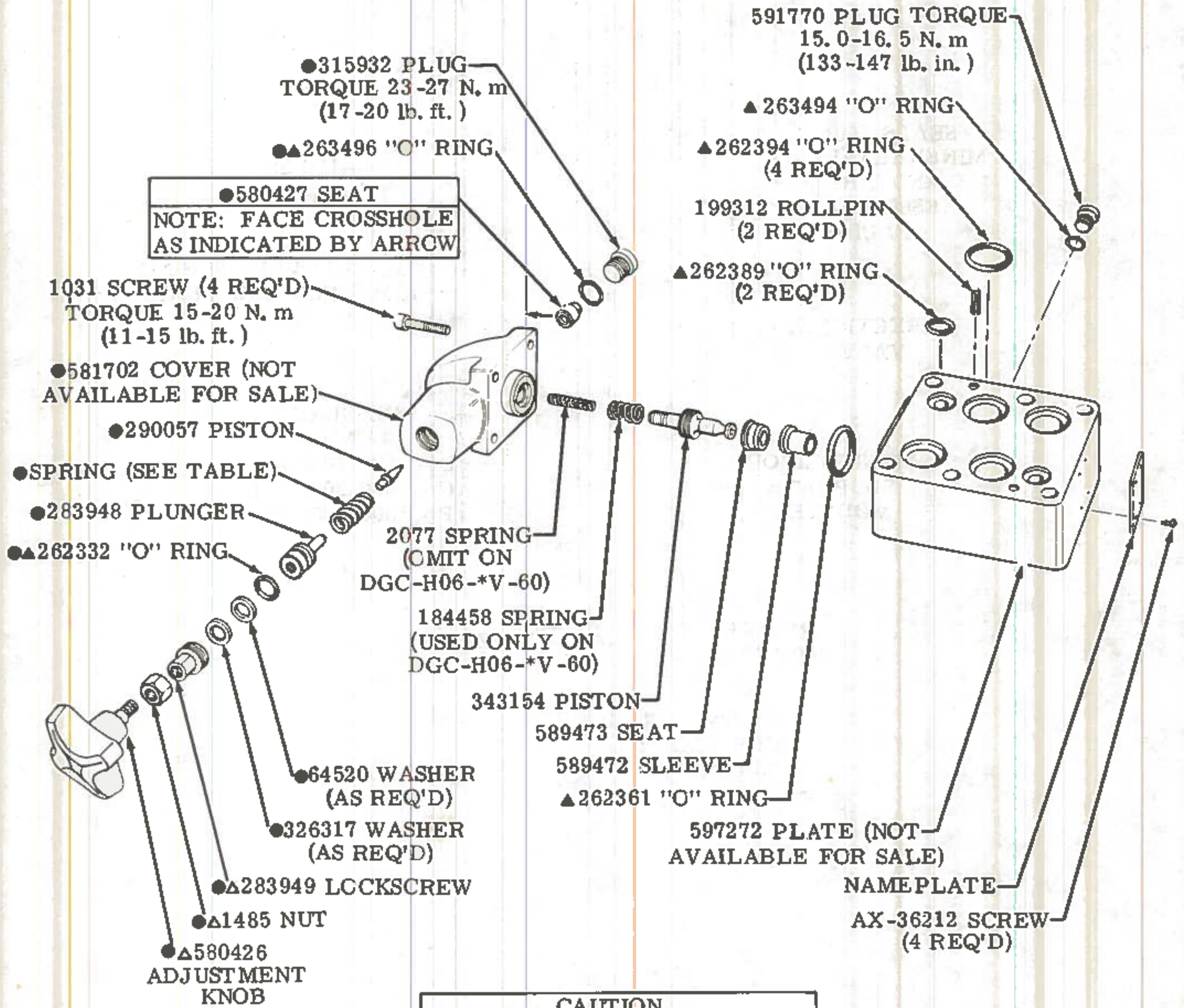
HIGH FLOW RELIEF VALVE MODULE

(F3)DGC-H06-*(*)-60



CAUTION
THIS MODULE CANNOT BE USED WITH PRESSURE CENTERED (D) VALVES.

●INCLUDED IN COVER S/A KIT

MODEL	●COVER S/A KIT	●SPRING
DGC-H06-B*-60	941280	2280
DGC-H06-C*-60	941281	583937
DGC-H06-F*-60	941282	2281

△COAT WITH OIL PRIOR TO ASSEMBLY

▲SERVICE ALL UNITS W/F3 SEAL KIT 919655

Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48084

MODEL CODE BREAKDOWN

F3-C*--***-(V)-DG-8C-M-M-W-B-30**

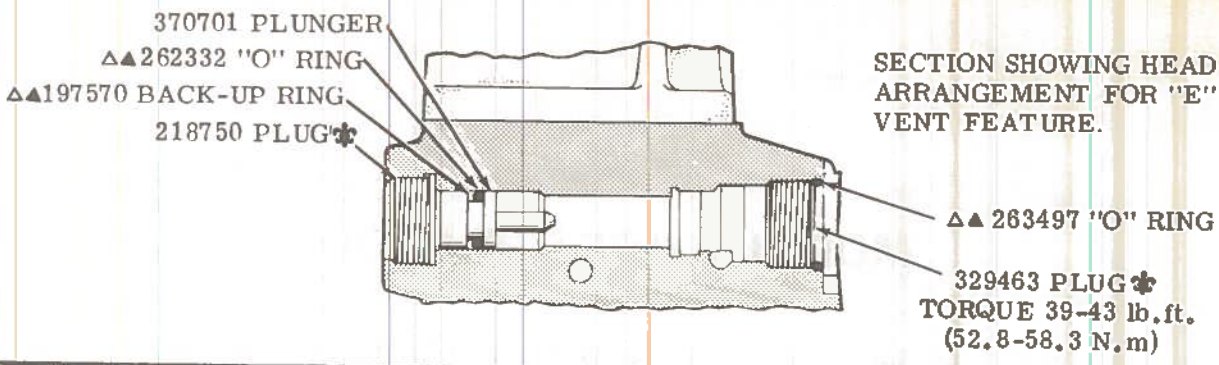
- **F3** – SEALS FOR PETROLEUM OIL AND SYNTHETIC FIRE RESISTANT FLUIDS
- **C** – RELIEF VALVE
- ***** – CONNECTION
  - G - SUBPLATE
  - S - STR. THD.
  - T - NPTF THD.
- ****** – NOMINAL SIZE
  - 06 - 3/4"
  - 10 - 1¼"
- ******* – PRESSURE RANGE HEAD 1, 2, OR 3

	PSI	(bar)
B -	125-1000	(8.5-70)
C -	500-2000	(35-140)
F -	1500-3000	(105-210)
E -	VENT	

- **(V)** – V - HI-VENT SPRING; OMIT - LO-VENT SPRING
- **DG** – DIRECTIONAL VALVE
- **8C** – SPOOL TYPE & SPRING ARRANGEMENT DG4V-3-8C-M(P**)-**-*-40-S288 (REFER TO I-3863-S FOR DETAILED SERVICE INFORMATION)
- **M** – FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS
- **M** – DG4V-3 PILOT VALVE & ADAPTER PLATE
- **W** – W - WIRING HOUSING ½" NPT. THD.
- **B** – COIL IDENTIFICATION LETTER (REFER TO I-3863-S)
- **30** – DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

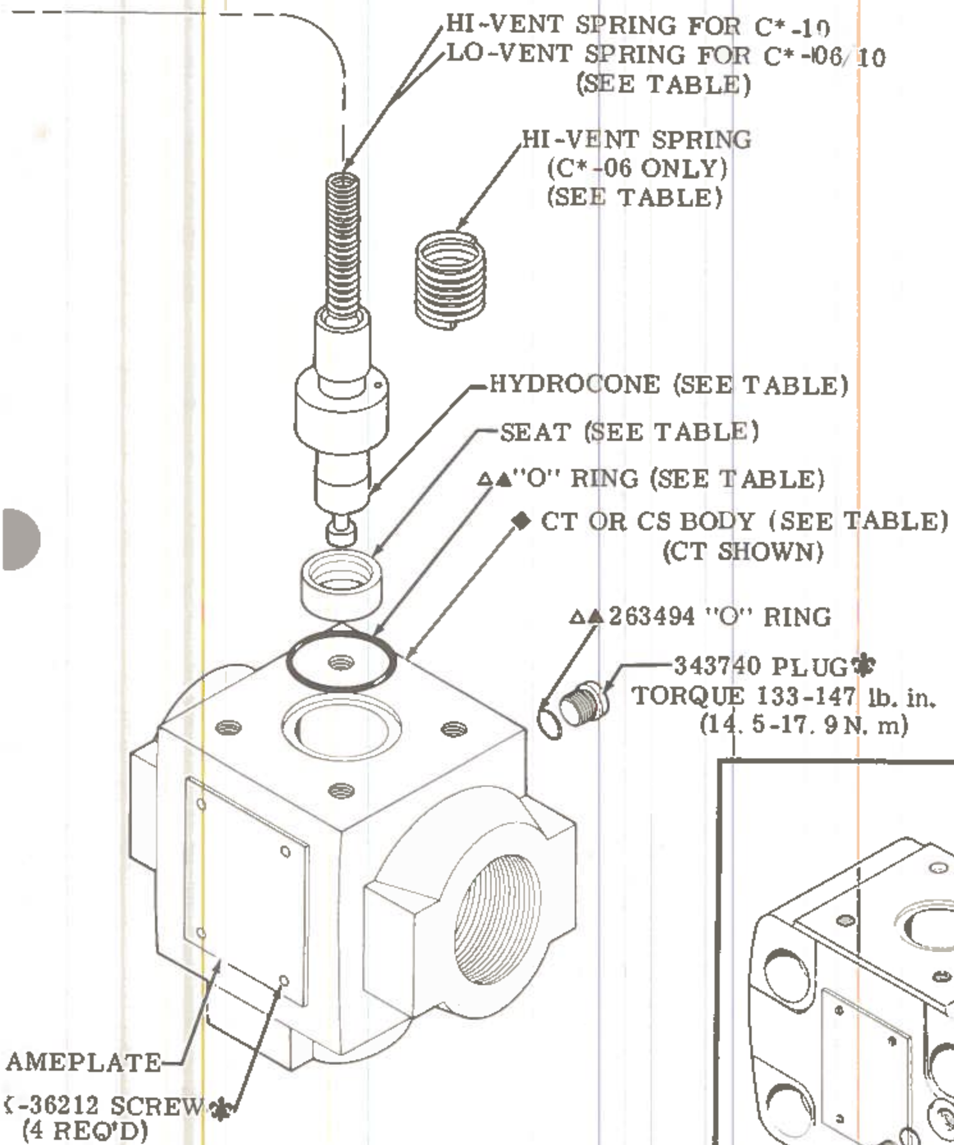
Litho in U. S. A.



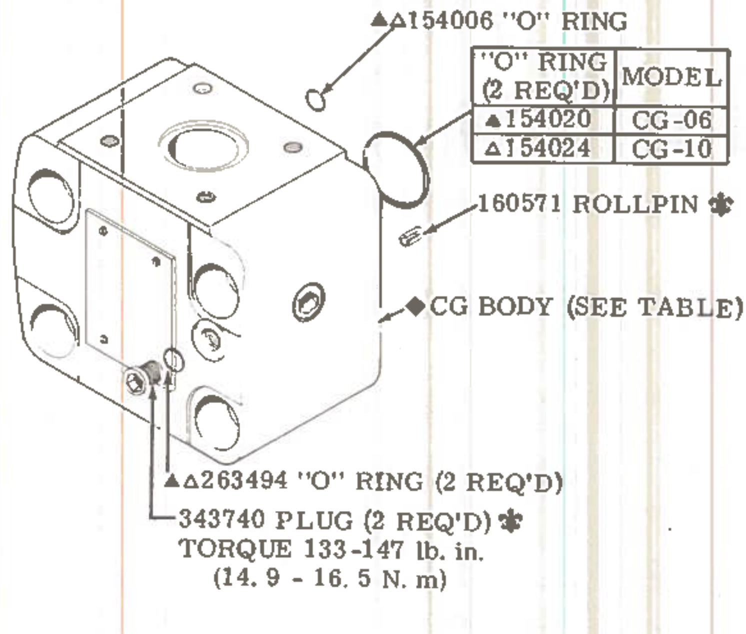
SECTION SHOWING HEAD ARRANGEMENT FOR "E" VENT FEATURE.

PART	KIT	PART	KIT
1485	944064	226816	944071
1649	944067	227405	944074
AX-36212	944053	292230	944072
64520	944068	326317	944073
113000	944055	329463	944041
160571	944069	343740	944038
218750	944070		

PARTS WITH ⚜ AVAILABLE ONLY IN KITS OF 25. REFERENCE KIT ON PARTS ORDER.



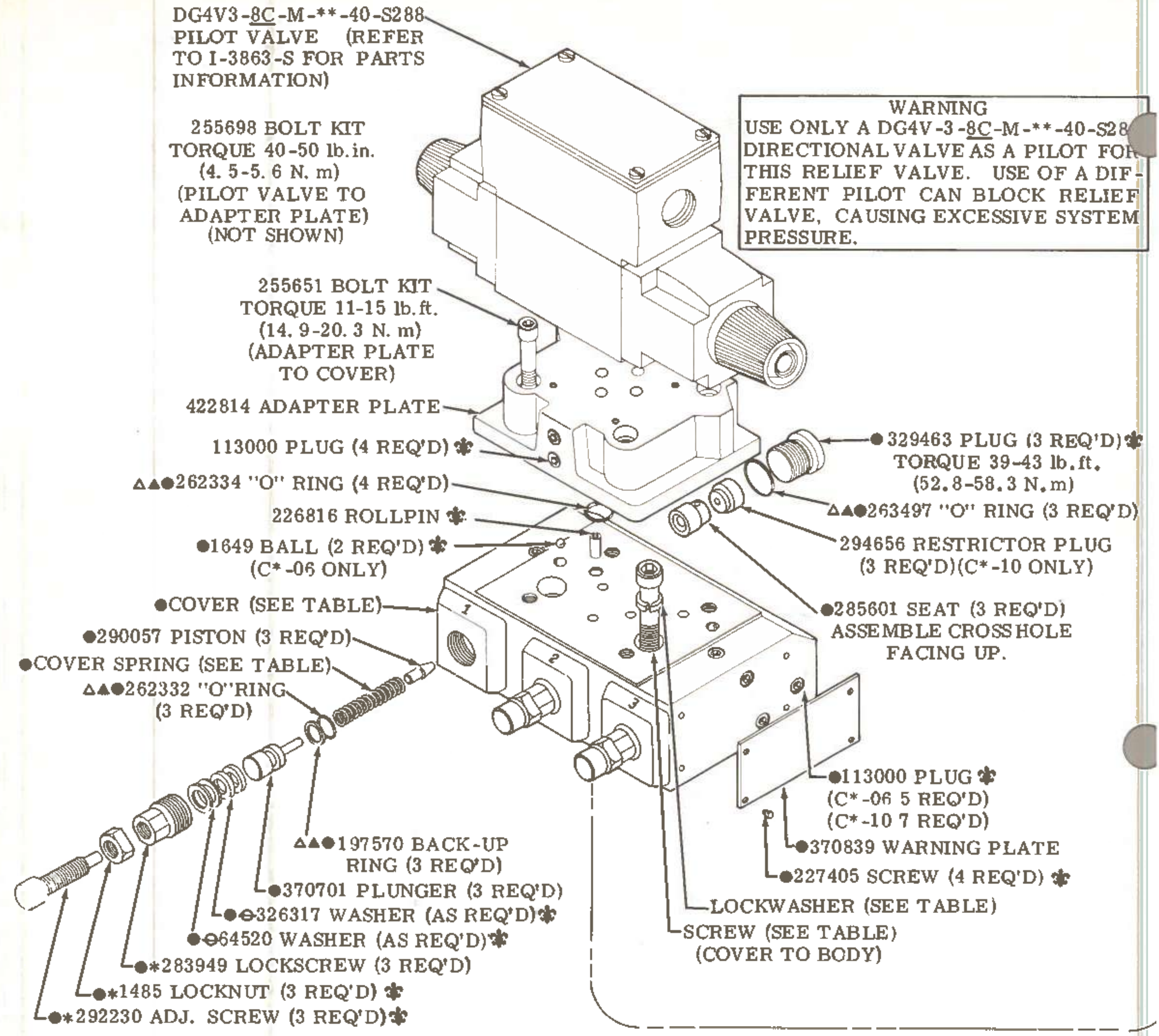
MODEL	◆BODY	
	-06	-10
CG-	580456	581703
CS-	581701	580430
CT-	590348	590300



"O" RING (2 REQ'D)	MODEL
▲154020	CG-06
△154024	CG-10

⚜AVAILABLE ONLY IN KITS OF 25
▲INCLUDED IN F3 -06 SEAL KIT 919684
△INCLUDED IN F3 -10 SEAL KIT 919685
◆NOT AVAILABLE FOR SALE

WARNING
USE ONLY A DG4V-3-8C-M-**-40-S288 DIRECTIONAL VALVE AS A PILOT FOR THIS RELIEF VALVE. USE OF A DIFFERENT PILOT CAN BLOCK RELIEF VALVE, CAUSING EXCESSIVE SYSTEM PRESSURE.



MODEL	COVER SPRING	PRESSURE RANGE PSI - (bar)
C*-***-B	2280	125-1000 (8.5-70)
C*-***-C	583937	500-2000 (35-140)
C*-***-F	2281	1500-3000 (105-210)

COVER KITS FOR C*-06-*** ARE AVAILABLE FOR SEVERAL SPRING ARRANGEMENTS.	
SPRING ORDER IN HEAD 1 2 3	● INCLUDED IN KIT (-06 ONLY)
-CBF-	942198
-CBC-	942202
-FFB-	942326

MODEL	SCREW (4 REQ'D)	TORQUE		L'WASHER (4 REQ'D)
		lb. ft.	N. m	
C*-06	1036	11-15	14.9-20.3	68907
C*-10	1076	35-43	47.5-58.3	68909

*NOTE
COAT 292230 ADJ. SCREW, 283949 LOCKSCREW AND 1485 LOCKNUT WITH OIL PRIOR TO ASSEMBLY.

MODEL	"O"RING	SEAT	HYDRO CONE	LO-VENT SPRING	HI-VENT SPRING	COVER
C*-06	●▲262361	343153	343154	2077	184458	370664
C*-10	△262367	283954	283952	291822	291821	370669

NOTE: USE EITHER A LO-VENT OR HI-VENT SPRING. DO NOT USE BOTH. SEE MODEL CODE

⊖THIS PART USED AT FINAL TEST TO OBTAIN CORRECT PRESSURE RANGE.

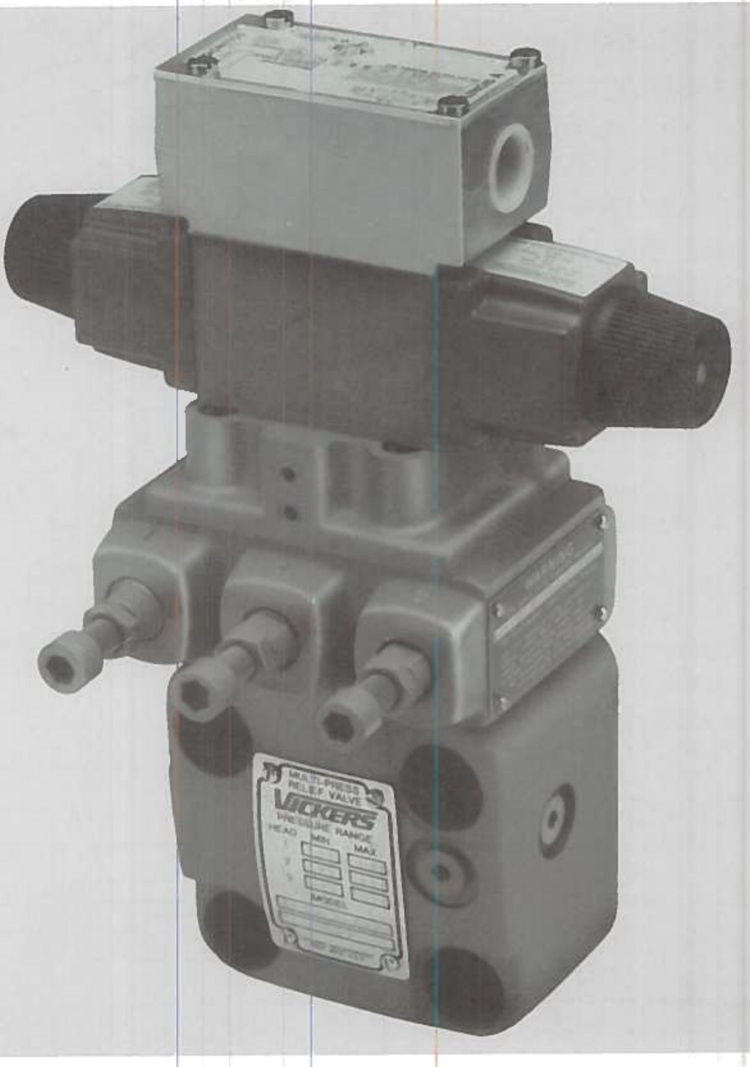
VICKERS®

A TRINOVA COMPANY

Service Parts Information

Multi-Pressure Relief Valve

CG/CS/CT-06-**(*)-(V)-DG8C(P)(L)-M(***)-M-**-*-30
CG/CS/CT-10-**(*)-(V)-DG8C(P)(L)-M(***)-M-**-*-30



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Released 8-1-86

I-3692-S

MODEL CODE BREAKDOWN

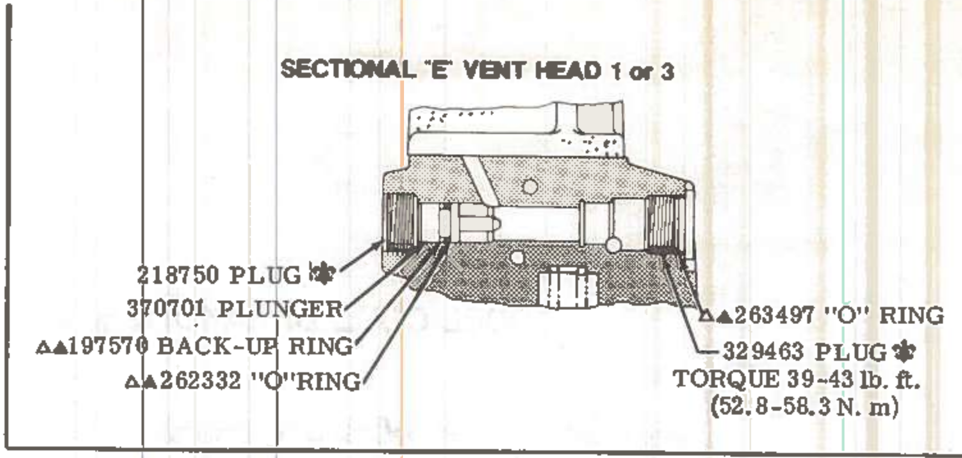
(F3)-C*--**-(V)-DG-0A-M-M-W-B-30**

- **(F3)** — SEALS FOR PETROLEUM OIL AND SYNTHETIC FIRE RESISTANT FLUIDS
- **C** — RELIEF VALVE
- ***** — CONNECTION
  - G - SUBPLATE
  - S - STR. THD.
  - T - NPTF THD.
- ****** — NOMINAL SIZE
  - 06 - 3/4"
  - 10 - 1¼"
- ****** — PRESSURE RANGE HEAD 1 OR 3

	PSI	(bar)
B -	125-1000	(8.5-70)
C -	500-2000	(35-140)
F -	1500-2000	(105-210)

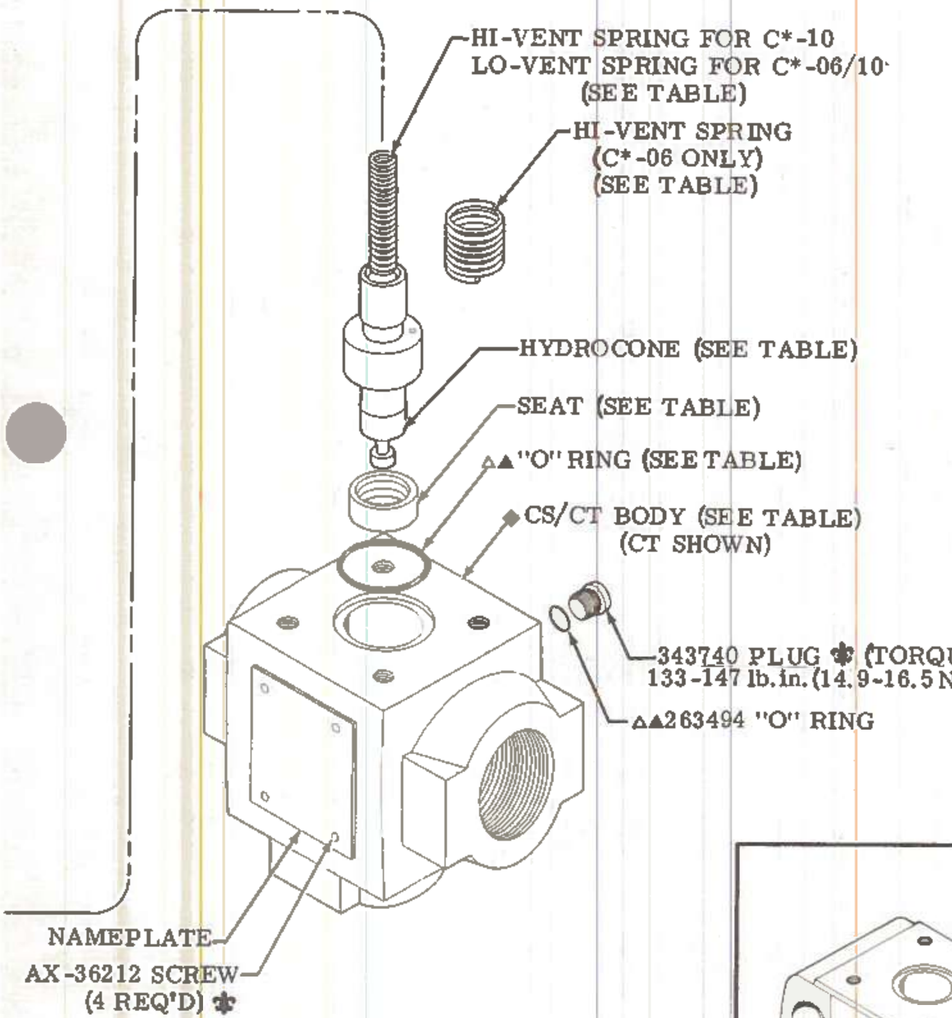
- **(V)** — V - HI-VENT SPRING; OMIT - LO-VENT SPRING
- **DG** — DIRECTIONAL VALVE
- **0A** — SPOOL TYPE & SPRING ARRANGEMENT DG4V-3-0A(L)-M-**-40 (REFER TO I-3861-S FOR DETAILED SERVICE INFORMATION)
- **M** — FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS.
- **M** — DG4V-3 PILOT VALVE & ADAPTER PLATE
- **W** — W - WIRING HOUSING ½" NPT. THD.
- **B** — COIL IDENTIFICATION LETTER (REFER TO I-3861-S)
- **30** — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

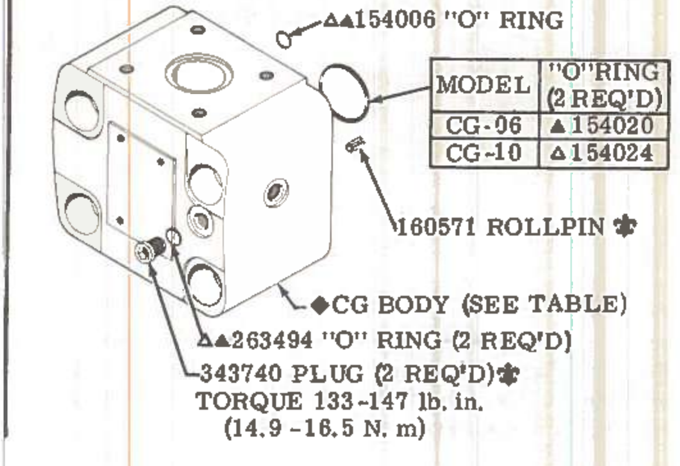


PART	KIT	PART	KIT
1485	944064	226816	944071
AX-36212	944053	227405	944074
64520	944068	292230	944072
113000	944055	326317	944073
160571	944069	329463	944041
218750	944070	343740	944038

PARTS WITH ✾ AVAILABLE ONLY IN KITS OF 25. REFERENCE KIT ON PARTS ORDER.



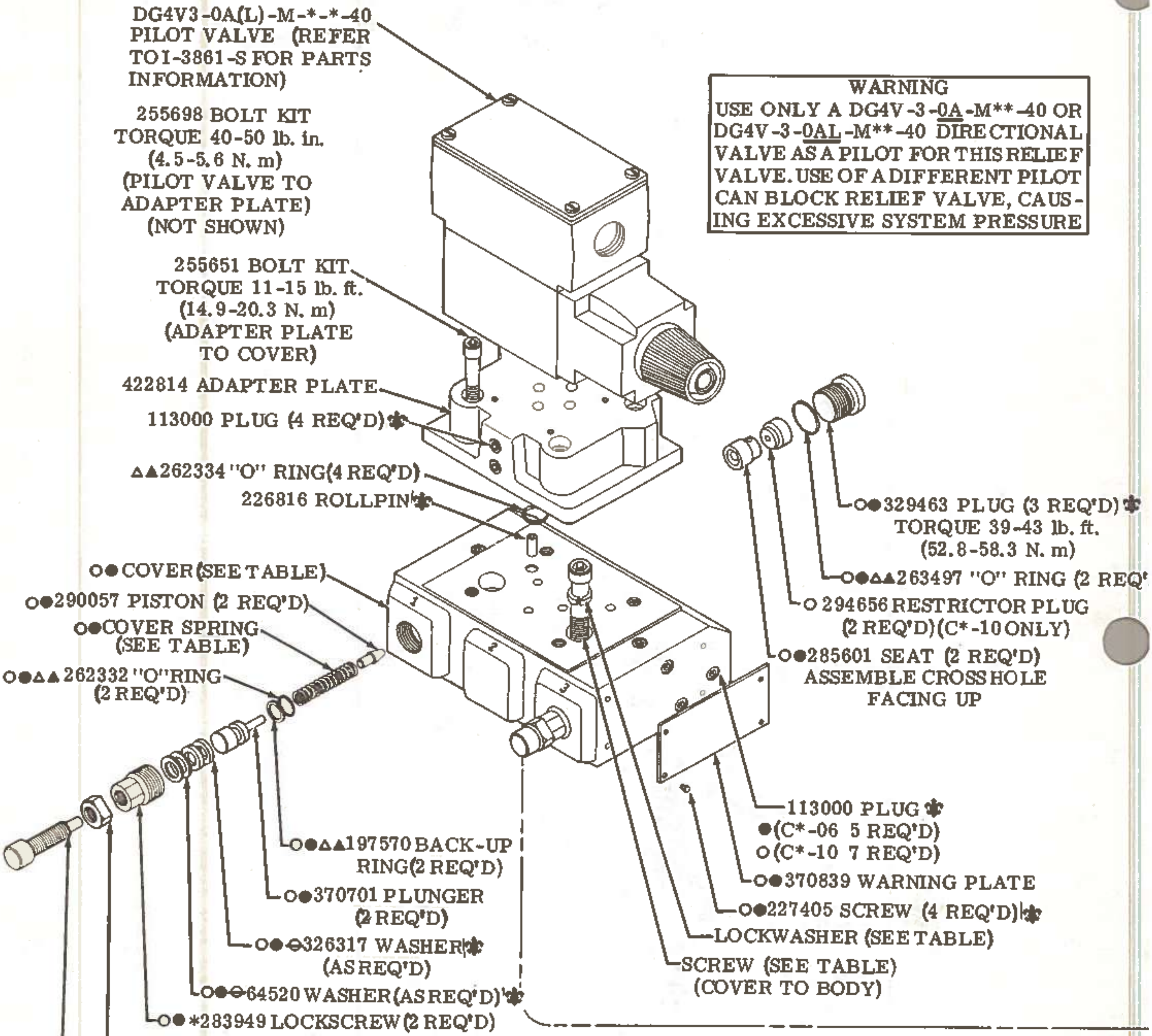
MODEL	◆BODY	
	-06	-10
CG	580456	581703
CS	581701	580430
CT	590348	590300



MODEL	"O" RING (2 REQ'D)
CG-06	▲154020
CG-10	△154024

✾ AVAILABLE ONLY IN KITS OF 25.
▲ INCLUDED IN -06 F3 SEAL KIT 919684
△ INCLUDED IN -10 F3 SEAL KIT 919685
● INCLUDED IN CT-06-BC COVER KIT 942155
○ INCLUDED IN CT-10-BC COVER KIT 942156
◆ NOT AVAILABLE FOR SALE

WARNING
USE ONLY A DG4V-3-0A-M**-40 OR DG4V-3-0AL-M**-40 DIRECTIONAL VALVE AS A PILOT FOR THIS RELIEF VALVE. USE OF A DIFFERENT PILOT CAN BLOCK RELIEF VALVE, CAUSING EXCESSIVE SYSTEM PRESSURE



MODEL	SCREW (4 REQ'D)	TORQUE lb. ft.	N. m	L'WASHER (4 REQ'D)
C*-06	1036	11-15	14.9-20.3	68907
C*-10	1076	35-43	47.5-58.3	68909

*NOTE
COAT 292230 ADJ. SCREW, 283949 LOCKSCREW AND 1485 LOCKNUT WITH OIL PRIOR TO ASSEMBLY.

⊖THIS PART USED AT FINAL TEST TO OBTAIN CORRECT PRESSURE RANGE.

MODEL	COVER SPRING	PRESSURE RANGE PSI (bar)
C*-**-B	2280	125-1000 (8.5-70)
C*-**-C	583937	500-2000 (35-140)
C*-**-F	2281	1500-3000 (105-210)

MODEL	"O"RING	SEAT	HYDRO CONE	LO-VENT SPRING	HI-VENT SPRING	COVER
C*-06	▲262361	343153	343154	2077	184458	●370666
C*-10	△262367	283954	283952	291822	291821	○370671

NOTE: USE EITHER A LO-VENT OR HI-VENT SPRING. DO NOT USE BOTH. (SEE MODEL CODE)

VICKERS®
A TRINOVA COMPANY

Service Parts Information

Multi-Pressure Relief Valve

CG/CS/CT-06-**(*)-(V)-DG0A(P)(L)-M(***)-M-**-*-30
CG/CS/CT-10-**(*)-(V)-DG0A(P)(L)-M(***)-M-**-*-30

Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007–0302

Released 8-1-86 **I-3693-S**

MODEL CODE BREAKDOWN

(F3)-C*--**-(V)-DG-8BL-M-M-W-B-30**

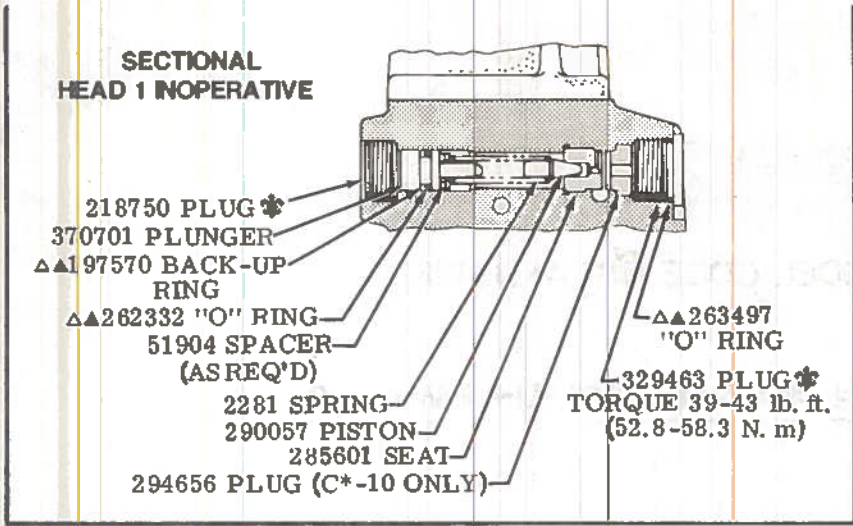
- (F3) — SEALS FOR PETROLEUM OIL AND SYNTHETIC FIRE RESISTANT FLUIDS
- C — RELIEF VALVE
- * — CONNECTION
  - G - SUBPLATE
  - S - STR. THD.
  - T - NPTF THD.
- ** — NOMINAL SIZE
  - 06 - 3/4"
  - 10 - 1¼"
- ** — PRESSURE RANGE HEAD 2 OR 3

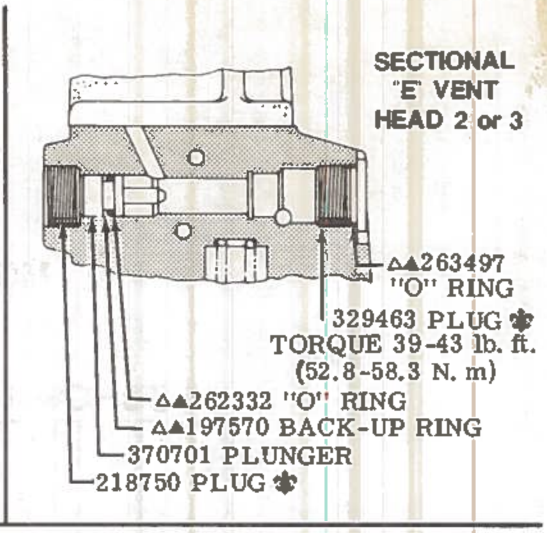
	PSI	(bar)
B -	125-1000	(8.5-70)
C -	500-2000	(35-140)
F -	1500-3000	(105-210)

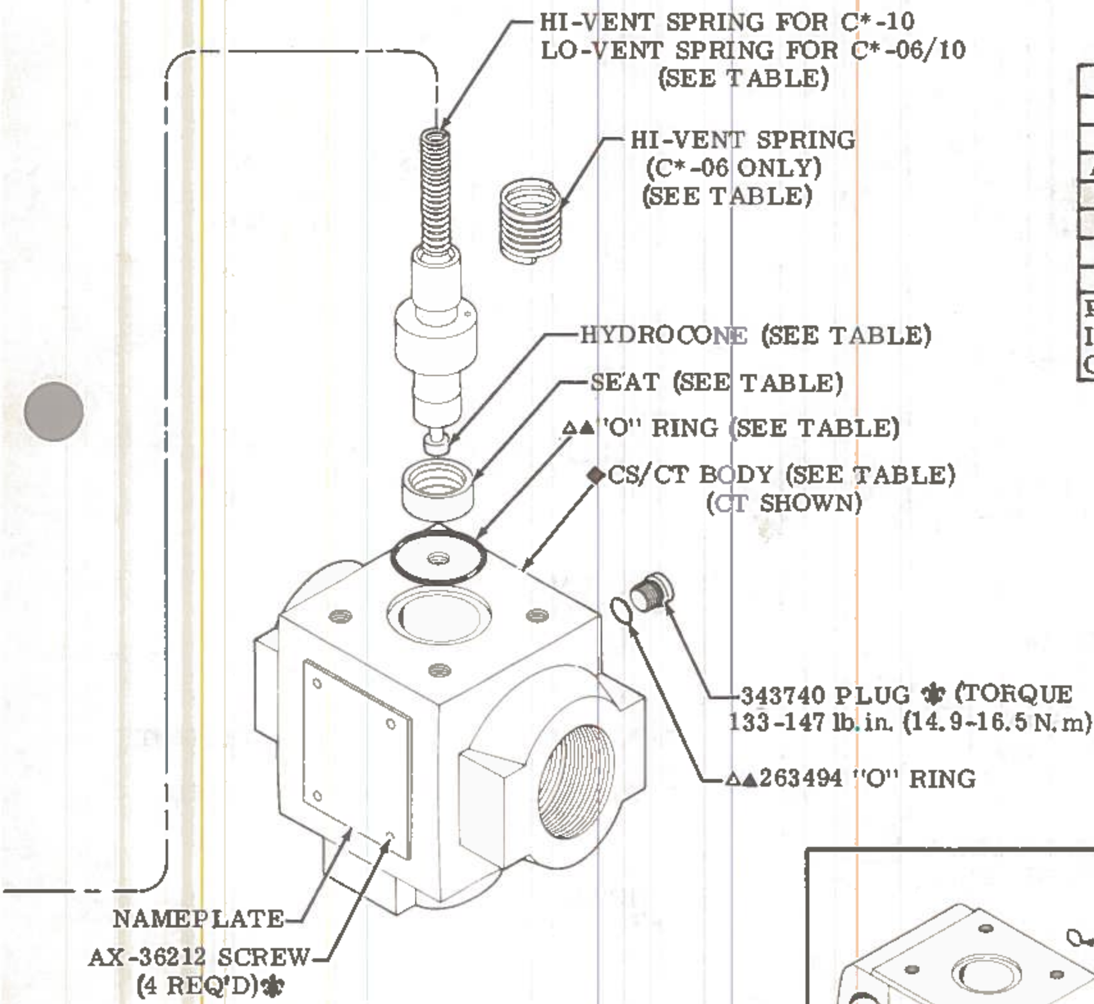
- (V) — V - HI-VENT SPRING; OMIT - LO-VENT SPRING
- DG — DIRECTIONAL VALVE
- 8BL — SPOOL TYPE & SPRING ARRANGEMENT DG4V-3-8BL-M-**-40 (REFER TO I-3862-S FOR DETAILED SERVICE INFORMATION)
- M — FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS
- M — DG4V-3 PILOT VALVE & ADAPTER PLATE
- W — W - WIRING HOUSING ½" NPT. THD.
- B — COIL IDENTIFICATION LETTER (REFER TO I-3862-S)
- 30 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.



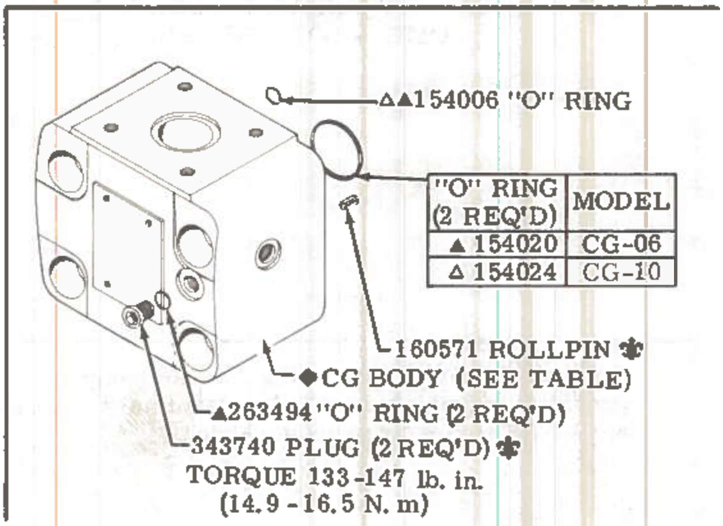




PART	KIT	PART	KIT
1485	944064	226816	944071
1649	944067	227405	944074
AX-36212	944053	292230	944072
64520	944068	326317	944073
113000	944055	329463	944041
160571	944069	343740	944038
218750	944070		

PARTS WITH ✽ AVAILABLE ONLY IN KITS OF 25. REFERENCE KIT ON PARTS ORDER.

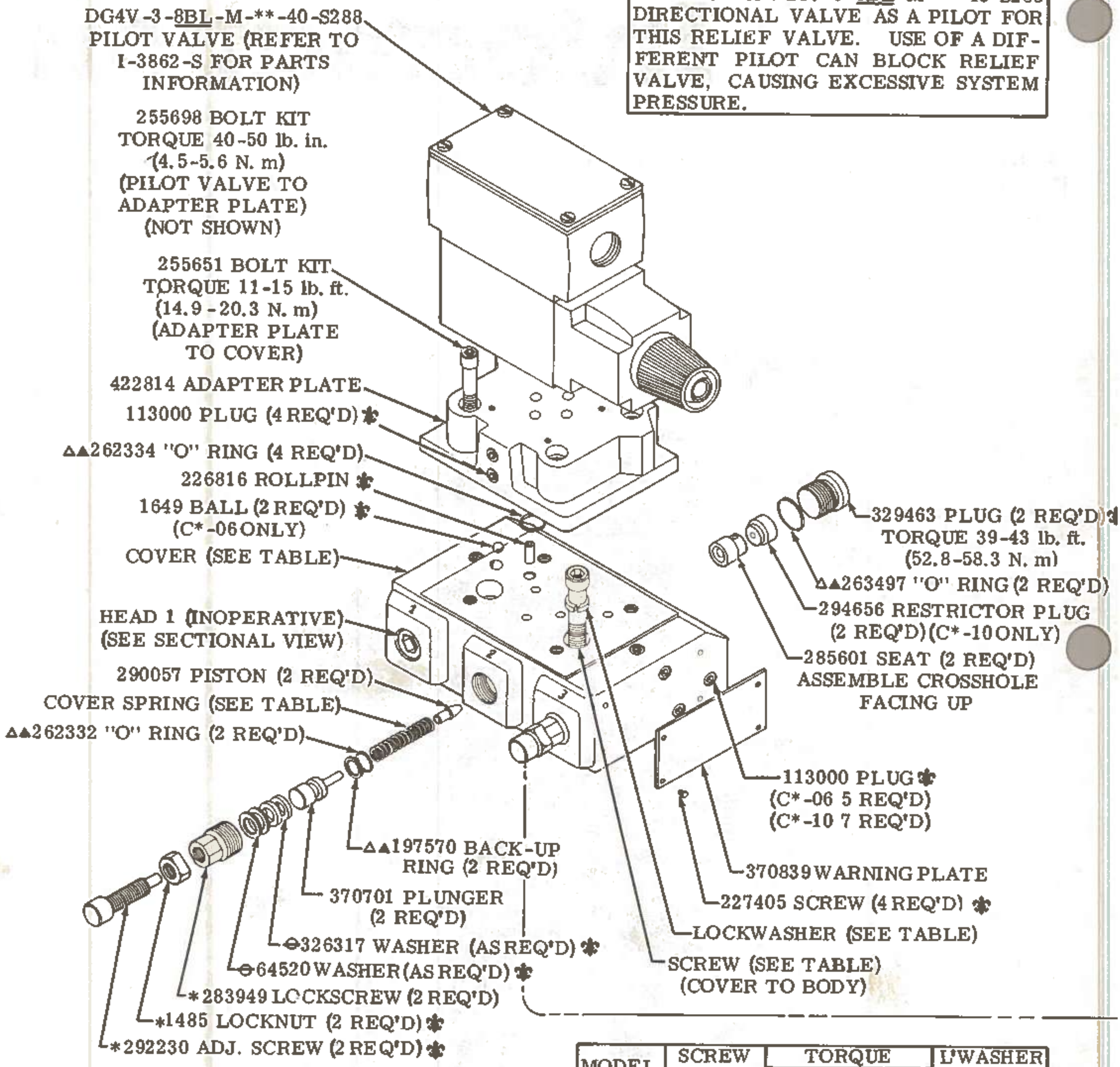
MODEL	◆BODY	
	-06	-10
CG	580456	581703
CS	581701	580430
CT	590348	590300



"O" RING (2 REQ'D)	MODEL
▲ 154020	CG-06
△ 154024	CG-10

▲INCLUDED IN -06 F3 SEAL KIT 919684
△INCLUDED IN -10 F3 SEAL KIT 919685
◆NOT AVAILABLE FOR SALE
✽AVAILABLE ONLY IN KITS OF 25

WARNING
USE ONLY A DG4V-3-8BL-M-**-40-S288 DIRECTIONAL VALVE AS A PILOT FOR THIS RELIEF VALVE. USE OF A DIFFERENT PILOT CAN BLOCK RELIEF VALVE, CAUSING EXCESSIVE SYSTEM PRESSURE.



MODEL	SCREW (4 REQ'D)	TORQUE lb. ft.	TORQUE N. m	L'WASHER (4 REQ'D)
C*-06	1036	11-15	14.9-20.3	68907
C*-10	1076	35-43	47.5-58.3	68909

*NOTE
COAT 292230 ADJ. SCREW, 283949 LOCKSCREW AND 1485 LOCKNUT WITH OIL PRIOR TO ASSEMBLY.

⊖THIS PART USED AT FINAL TEST TO OBTAIN CORRECT PRESSURE RANGE.

MODEL	COVER SPRING	PRESSURE RANGE PSI (bar)
C*-**-B	2280	125-1000 (8.5-70)
C*-**-C	583937	500-2000 (35-140)
C*-**-F	2281	1500-3000 (105-210)

MODEL	"O" RING	SEAT	HYDRO CONE	LO-VENT SPRING	HI-VENT SPRING	COVER
C*-06	▲ 262361	343153	343154	2077	184458	370664
C*-10	△ 262367	283954	283952	291822	291821	370669

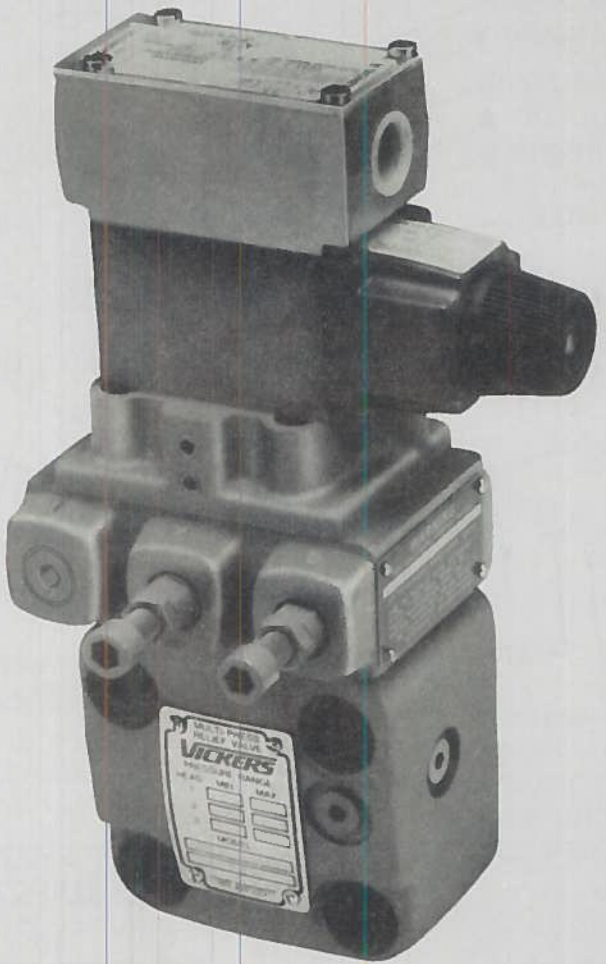
NOTE: USE EITHER A LO-VENT OR HI-VENT SPRING. DO NOT USE BOTH. (SEE MODEL CODE)

VICKERS®
A TRINOVA COMPANY

Service Parts Information

Multi-Pressure Relief Valve

CG/CS/CT-06-**(*)-(V)-DG8BL-M(***)-M-**-*-30
CG/CS/CT-10-**-(*)-(V)-DG8BL-M(***)-M-**-*-30



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Released 8-1-86 **I-3694-S**

MODEL CODE BREAKDOWN

(F3) CG – 10 – *(V)(Y) – 30

- **(F3)** — MULTI-FLUID CAPABILITY (VITON SEALS)
- **C** — RELIEF VALVE
- **G** — MANIFOLD OR SUBPLATE MOUNTED
- **10** — SIZE
  10 - $1\frac{1}{4}$ INCH
- ***** — PRESSURE RANGE
  B - 125-1000 PSI
  C - 500-2000 PSI
  F - 1500-3000 PSI
- **(V)** — VENT PRESSURE
  V - HIGH VENT PRESSURE
  OMITTED - STANDARD VENT PRESSURE
- **(Y)** — EXTERNAL DRAIN FEATURE
  Y - SEQUENCE VALVE
  OMITTED - RELIEF VALVE
- **30** — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

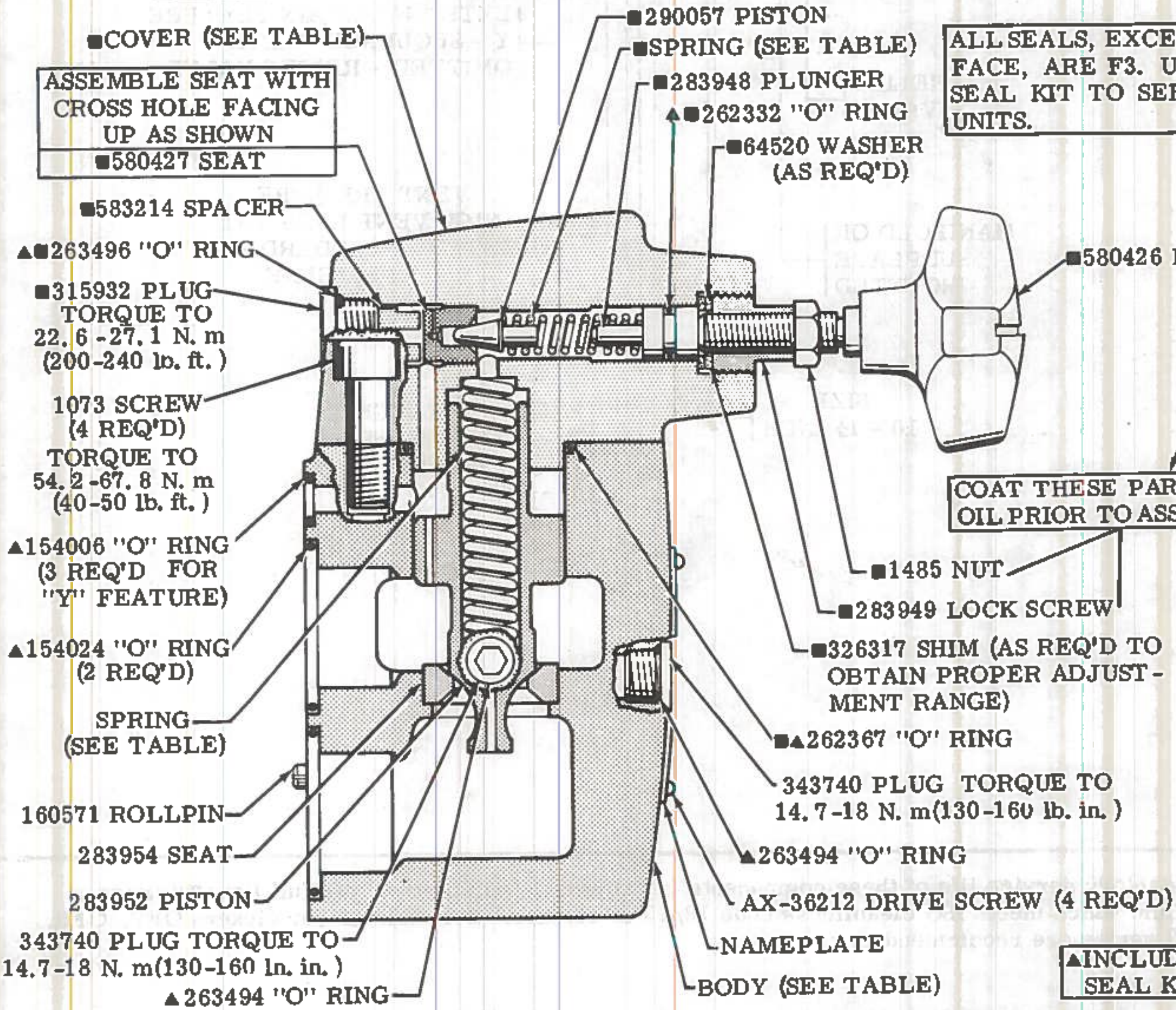
Service Parts Information

VICKERS®
A TRINOVA COMPANY

BALANCED PISTON TYPE SEQUENCE & RELIEF VALVES

CG-10-***-30

MODEL	■ COVER	BODY	SPRING	■ SPRING	PRESSURE RANGE PSI	■ INCLUDED IN COVER S/A
CG-10-B-30	581700	581703	291822	2280	125-1000	941286
CG-10-BV-30			291821			
CG-10-BVY-30	590299	591450				—
CG-10-BY-30			291822			
CG-10-C-30	581700	581703		583937	500-2000	941287
CG-10-CV-30			291821			
CG-10-CVY-30	590299	591450				—
CG-10-CY-30			291822			
CG-10-F-30	581700	581703		2281	1500-3000	941288
CG-10-FV-30			291821			
CG-10-FVY-30	590299	591450				—
CG-10-FY-30			291822			



ALL SEALS, EXCEPT INTERFACE, ARE F3. USE THE F3 SEAL KIT TO SERVICE ALL UNITS.

COAT THESE PARTS WITH OIL PRIOR TO ASSEMBLY.

▲INCLUDED IN F3 SEAL KIT 919920

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

(F3) C* – 10 – *(V)(Y) – 30

- **(F3)** – MULTI-FLUID CAPABILITY (VITON SEALS)
- **C** – RELIEF VALVE
- ***** – THREADS
  - S - SAE STRAIGHT
  - T - NPTF PIPE
- **10** – SIZE
  - 10 - $1\frac{1}{4}$ INCH
- ***** – PRESSURE RANGE
  - B - 125-1000 PSI
  - C - 500-2000 PSI
  - F - 1500-3000 PSI
- **(V)** – VENT PRESSURE
  - V - HIGH VENT PRESSURE
  - OMITTED - STANDARD VENT PRESSURE
- **(Y)** – EXTERNAL DRAIN FEATURE
  - Y - SEQUENCE VALVE
  - OMITTED - RELIEF VALVE
- **30** – DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

VICKERS®
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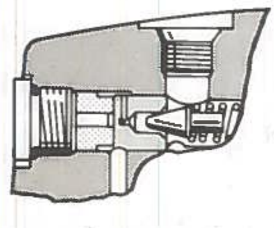
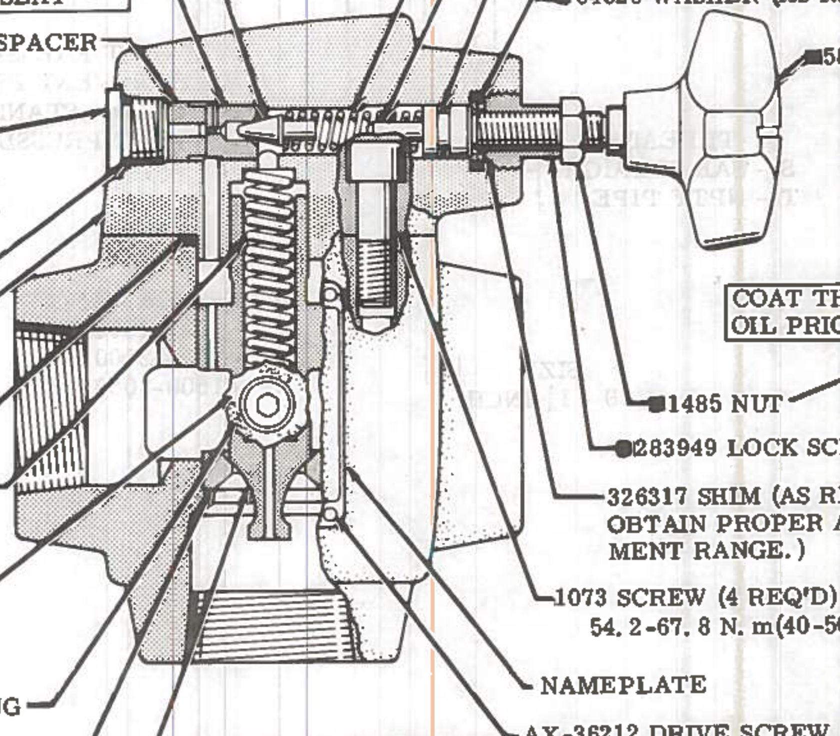
BALANCED PISTON TYPE RELIEF VALVES

(F3)C*-10-*(V)(Y)-30

MODEL	◆■ COVER	SPRING	■ SPRING	PRESSURE RANGE PSI	■INCLUDED IN COVER S/A
C*-10-B-30	581700	291822	2280	125-1000	941286
C*-10-BV-30		291821			
C*-10-BVY-30	590304				—
C*-10-BY-30		291822			
C*-10-C-30	581700		583937	500-2000	941287
C*-10-CV-30		291821			
C*-10-CVY-30	590304				—
C*-10-CY-30		291822			
C*-10-F-30	581700		2281	1500-3000	941288
C*-10-FV-30		291821			
C*-10-FVY-30	590304				926596
C*-10-FY-30		291822			



"Y" COVER ASSEMBLY (SEE TABLE)



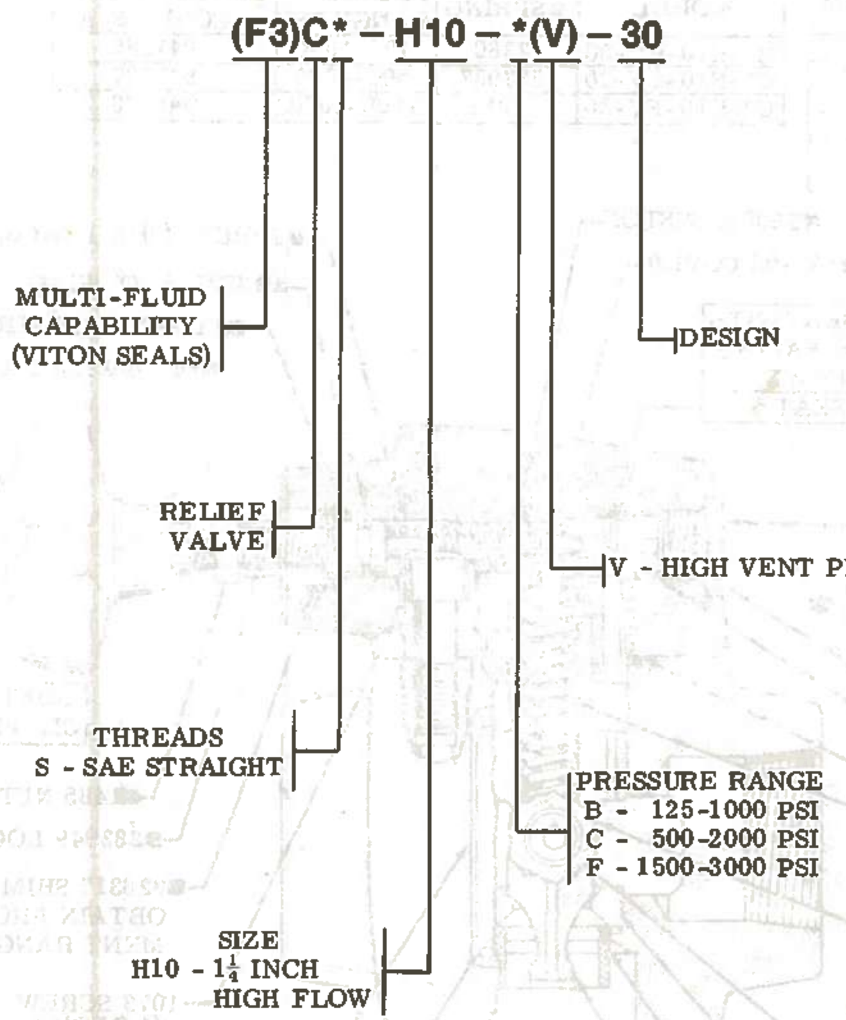
MODEL	◆BODY
CS-10-*(V)(Y)-30	580430
CT-10-*(V)(Y)-30	590300

▲INCLUDED IN F3 SEAL KIT 920225

◆NOT AVAILABLE FOR SALE AS INDIVIDUAL PARTS

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

BALANCED PISTON TYPEHIGH FLOW RELIEF VALVES | **(F3)CS-H10-*(V)-30**

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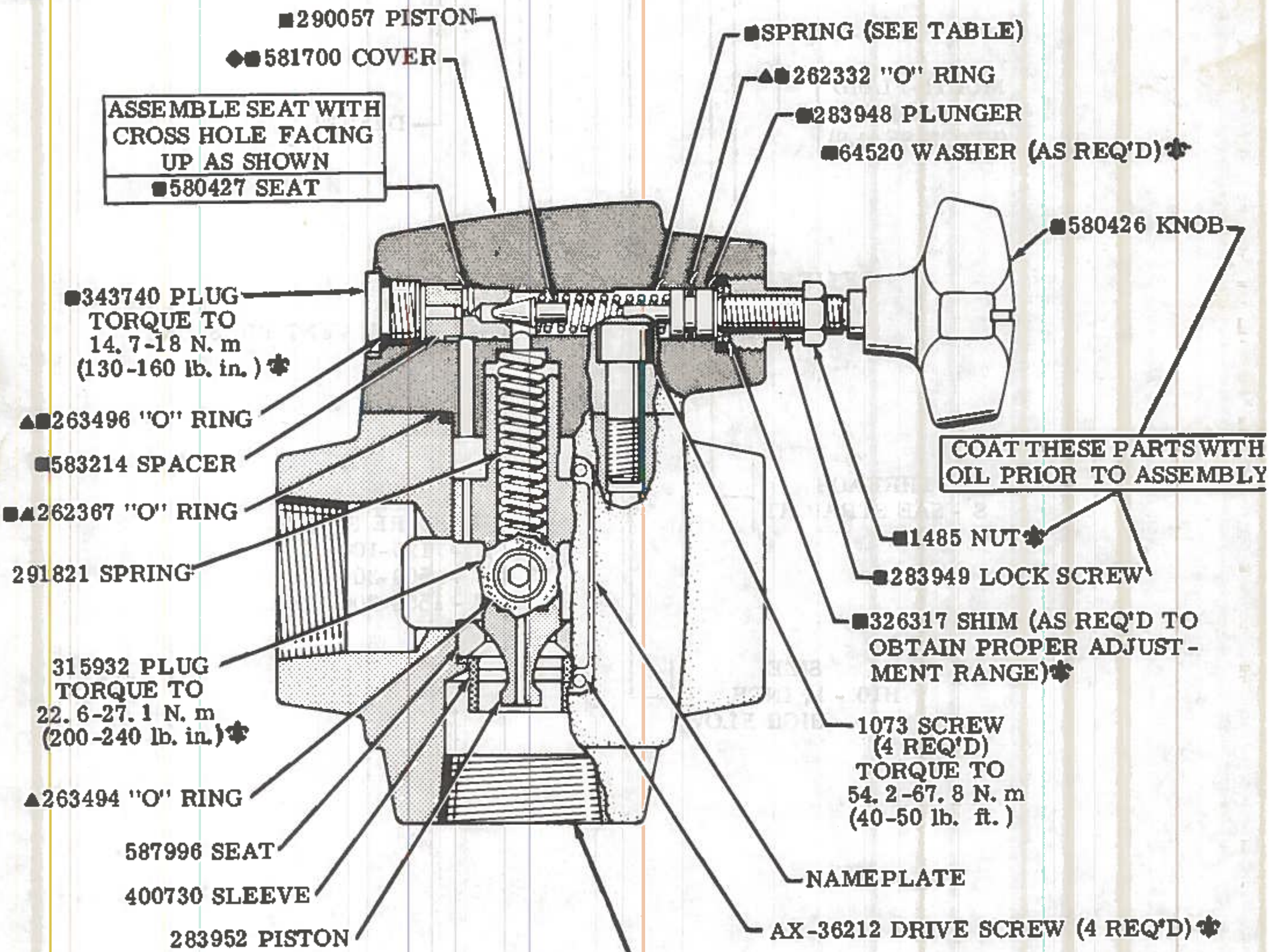
A TRINOVA COMPANY

AVAILABLE IN LOT KITS OF 25 PCS.✤	
1485	944064
36212	944053
64520	944068
326317	944073
343740	944038
315932	944062

MODEL	■SPRING	PRESSURE RANGE PSI	■INCLUDED IN COVER S/A
C*-H10-BV-30	2280	125-1000	941286
C*-H10-CV-30	583937	500-2000	941287
C*-H10-FV-30	2281	1500-3000	941288



MODEL	◆BODY
CS-H10-*V-30	580430

▲SERVICE ALL UNITS W/F3 SEAL KIT 920225

◆NOT AVAILABLE FOR SALE AS INDIVIDUAL PART

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

(F3)	–	C	*	19	–	(H)	10	*	*	(P)	–	*	(V)	–	(***)	–	90
1		2	3	4		5	6	7	8	9		10	11		12		13

1 Seals for Mineral Oil & Fire Resistant Fluids
(Omit if not Required)

2 Relief Valve

3 Connections
- G – Subplate Mounting
- S – Straight Threads
- T – NPTF Threads

4 Air Controlled, Pilot Operated

5 High Flow
CG & CS Models Only
(Omit if not Required)

6 Valve Size
1 1/4 inch

7 Pilot Valve Spool Type

8 Pilot Valve Function
- A – Spring Offset (Single Operator)
- B – Spring Centered (Operator 'A' Removed)
- C – Spring Centered (Dual Operator)
- F – Spring Offset (Pressurize to Center)

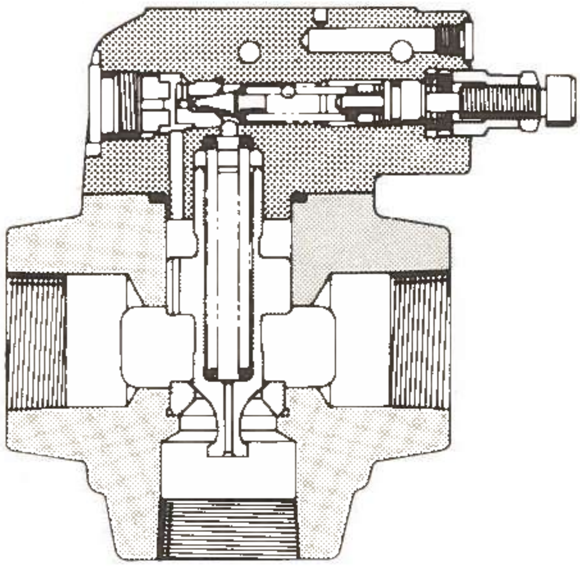
9 Manual Operator Option in End Cap for Single Operator Models Only
(Omit if not Required)

10 Pressure Range
- B – 125–1000 psi
- C – 500–2000 psi
- F – 1500–3000 psi

11 High Vent
(Omit if not Required)

12 Pilot Valve Port Orifices
(Omit if not Required)

13 Design



RELIEF VALVE SECTIONAL VIEW WITHOUT PILOT VALVE

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

Litho in U.S.A.

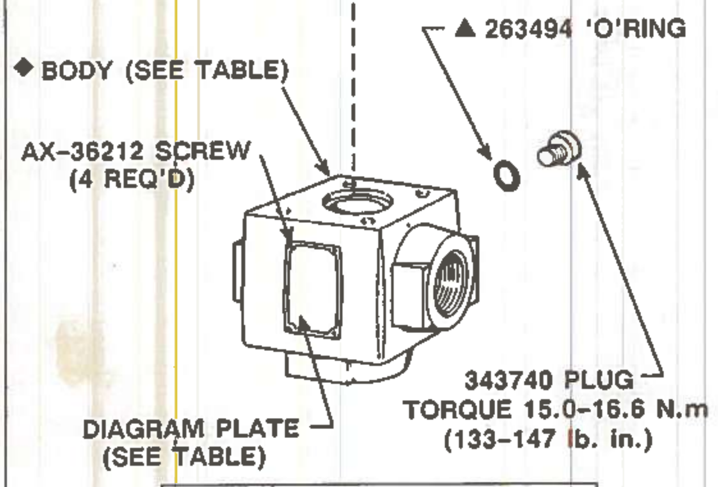
MODEL	DIAGRAM PLATE	PILOT VALVE	PILOT VALVE PARTS DRWG.
C*19-(H)060A(P)-*(V)-90	422864	DG18V-3-0BL-40	I-3616-S
C*19-(H)061A(P)-*(V)-90	422865	DG18V-3-2AL-40	
C*19-(H)062A(P)-*(V)-90	423814	DG18V-3-2BL-40	
C*19-(H)060C-*(V)-90	422862	DG18V-3-0C-40	
C*19-(H)062C-*(V)-90	422863	DG18V-3-2C-40	
C*19-(H)060F(P)-*(V)-90	——	DG18V-3-0FL-40	

MODEL	■ COVER S/A
C*19-(H)060A/F-B(V)-90	942432
C*19-(H)060A/F-C(V)-90	942433
C*19-(H)060A/F-F(V)-90	942434
C*19-(H)061A-B(V)-90	942435
C*19-(H)062A-B(V)-90	
C*19-(H)06*C-B(V)-90	
C*19-(H)061A-C(V)-90	942436
C*19-(H)062A-C(V)-90	
C*19-(H)06*C-C(V)-90	
C*19-(H)061A-F(V)-90	942437
C*19-(H)062A-F(V)-90	
C*19-(H)06*C-F(V)-90	

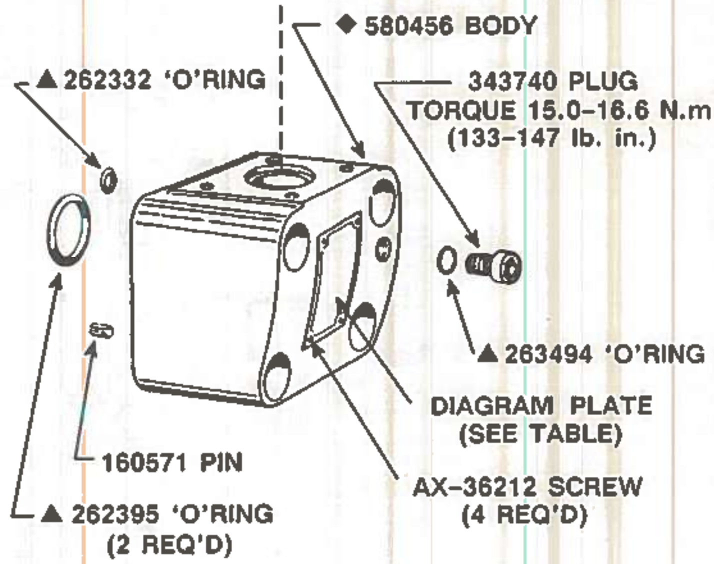
MODEL	■ COVER	■ PLUG/'O'RING (2 REQ'D)	■ PLUG/'O'RING
C*19-(H)060A-90	422828	——	——
C*19-(H)061A-90	424203	343740/ ▲263494	398071/▲ 263492
C*19-(H)062A-90			
C*19-(H)06*C-90			

NOTE
PARTS PREFIXED WITH A SYMBOL ARE AVAILABLE ONLY IN KITS.

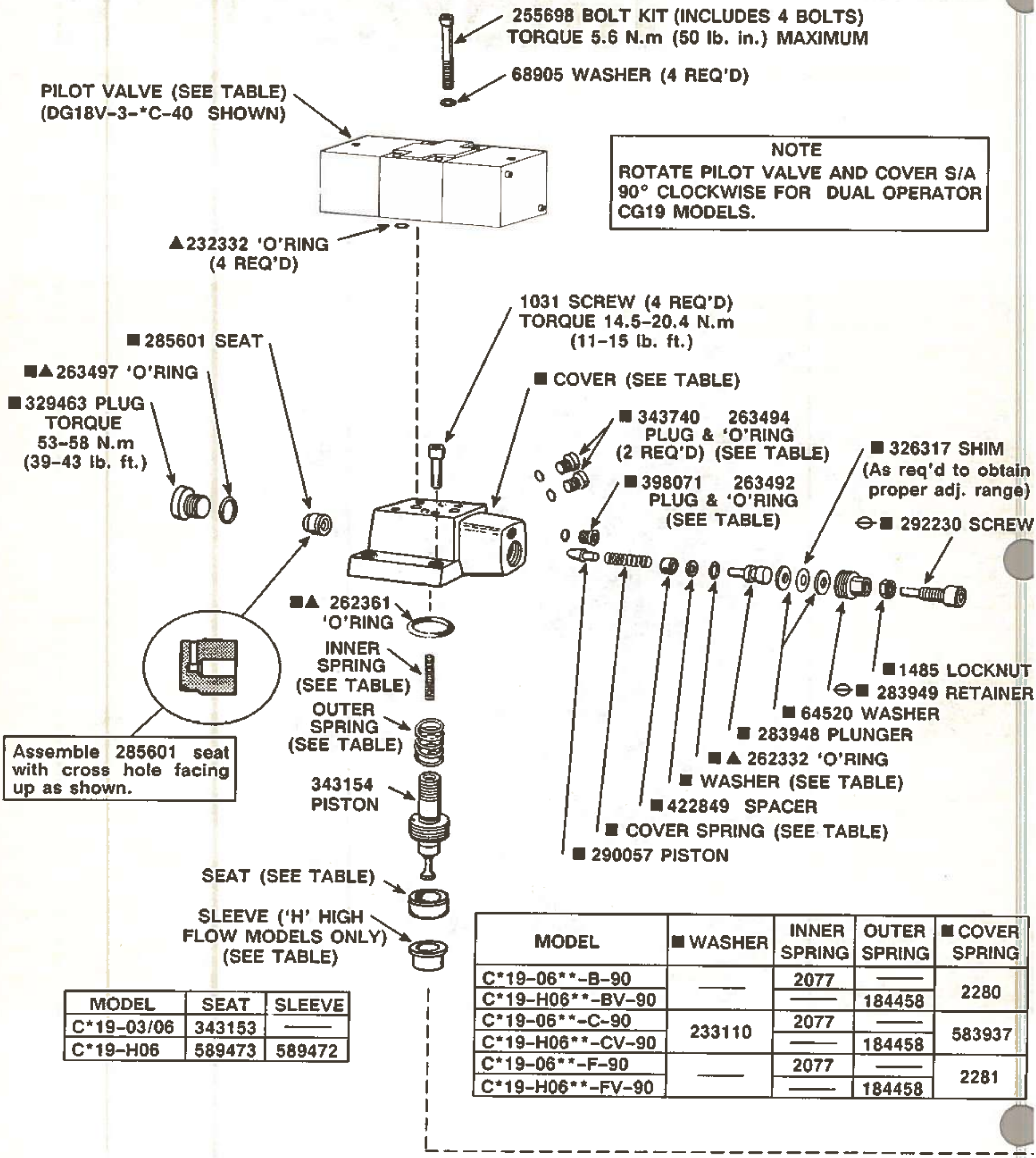
- ■ INCLUDED IN COVER S/A
- ▲ INCLUDED IN F3 SEAL KIT 920345 (INCLUDES PILOT VALVE SEALS)
- ⊖ LUBRICATE WITH OIL BEFORE ASSEMBLY
- ◆ NOT AVAILABLE FOR SALE



◆BODY	MODEL
590407	CS19-03**-*-90
581701	CS19-(H)06**-*(V)-90
590348	CT19-06**-*-90



CG19-(H)06**-*(V)-90



NOTE
ROTATE PILOT VALVE AND COVER S/A 90° CLOCKWISE FOR DUAL OPERATOR CG19 MODELS.

MODEL	SEAT	SLEEVE
C*19-03/06	343153	——
C*19-H06	589473	589472

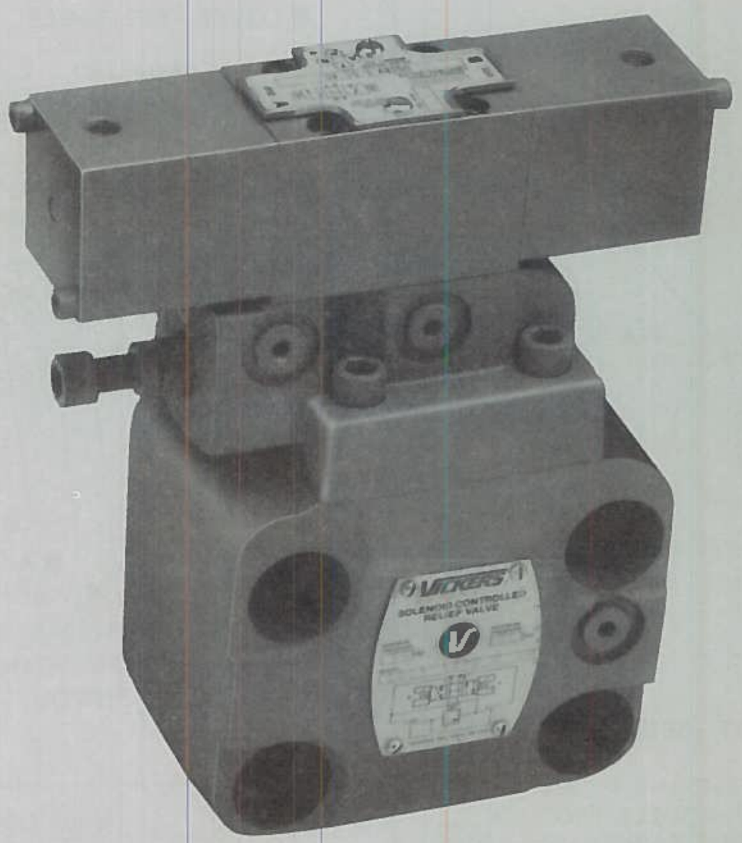
MODEL	■ WASHER	INNER SPRING	OUTER SPRING	■ COVER SPRING
C*19-06**-B-90	——	2077	——	2280
C*19-H06**-BV-90		——	184458	
C*19-06**-C-90	233110	2077	——	583937
C*19-H06**-CV-90		——	184458	
C*19-06**-F-90	——	2077	——	2281
C*19-H06**-FV-90		——	184458	

Service Parts Information

VICKERS®
A TRINOVA COMPANY

AIR CONTROLLED RELIEF VALVES

(F3)-CG19-(H)10**(P)-*(V)-(***)-90
(F3)-CS19-(H)10**(P)-*(V)-(***)-90
(F3)-CT19-10**(P)-*-(***)-90



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Released 9-1-87

I-3429-S

MODEL CODE BREAKDOWN

(F3) –	C	*	19 –	(H)	**	*	*	(P) –	*	(V) –	(***) –	90
1	2	3	4	5	6	7	8	9	10	11	12	13

1 Seals for Mineral Oil & Fire Resistant Fluids
(Omit if not Required)

2 Relief Valve

3 Connections
- G – Subplate Mounting
- S – Straight Threads
- T – NPTF Threads

4 Air Controlled, Pilot Operated

5 High Flow
CG & CS Models Only
(Omit if not Required)

6 Valve Size
- 03 – 3/8 inch
- 06 – 3/4 inch

7 Pilot Valve Spool Type

8 Pilot Valve Function
- A – Spring Offset (Single Operator)
- B – Spring Centered (Operator 'A' Removed)
- C – Spring Centered (Dual Operator)
- F – Spring Offset (Single Operator) (Pressurize to Center)

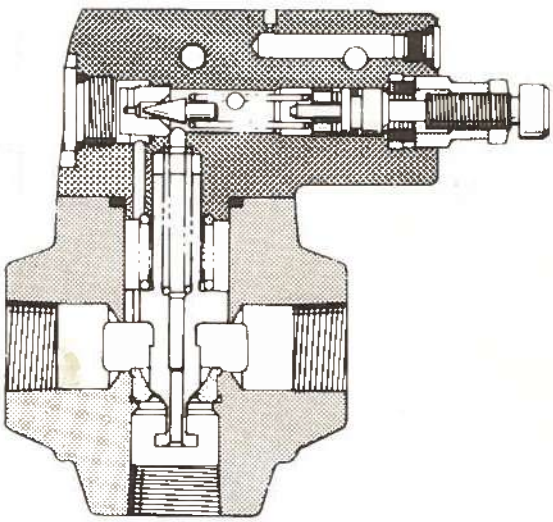
9 Manual Operator Option in End Cap for Single Operator Models Only
(Omit if not Required)

10 Pressure Range
- B – 125–1000 psi
- C – 500–2000 psi
- F – 1500–3000 psi

11 High Vent
(Omit if not Required)

12 Pilot Valve Port Orifices
(Omit if not Required)

13 Design



RELIEF VALVE SECTIONAL VIEW WITHOUT PILOT VALVE

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

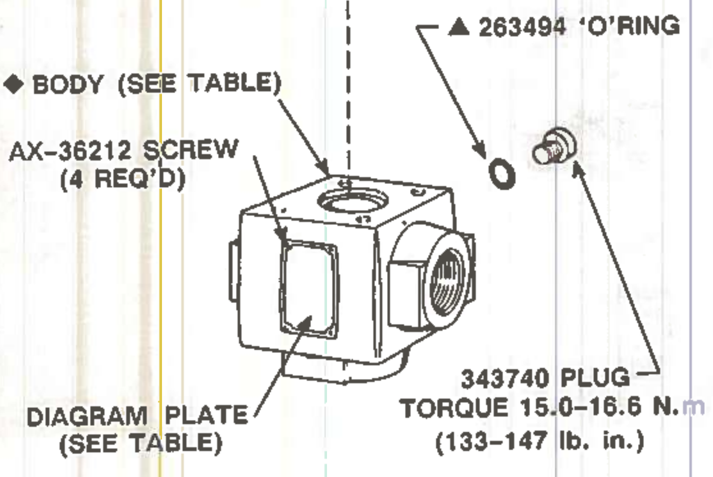
MODEL	DIAGRAM PLATE	PILOT VALVE	PILOT VALVE PARTS DRWG.
C*19-(H)100A(P)-*(V)-90	422864	DG18V-3-0BL-**-40	I-3616-S
C*19-(H)101A(P)-*(V)-90	422865	DG18V-3-2AL-**-40	
C*19-(H)102A(P)-*(V)-90	423814	DG18V-3-2BL-**-40	
C*19-(H)100C-*(V)-90	422862	DG18V-3-0C-**-40	
C*19-(H)102C-*(V)-90	422863	DG18V-3-2C-**-40	
C*19-(H)100F(P)-*(V)-90	———	DG18V-3-0FL-**-40	

MODEL	■ COVER S/A
C*19-(H)100A/F-B(V)-90	942456
C*19-(H)100A/F-C(V)-90	942457
C*19-(H)100A/F-F(V)-90	942458
C*19-(H)101A-B(V)-90	942459
C*19-(H)102A-B(V)-90	
C*19-(H)10*C-B(V)-90	
C*19-(H)101A-C(V)-90	942460
C*19-(H)102A-C(V)-90	
C*19-(H)10*C-C(V)-90	
C*19-(H)101A-F(V)-90	942461
C*19-(H)102A-F(V)-90	
C*19-(H)10*C-F(V)-90	

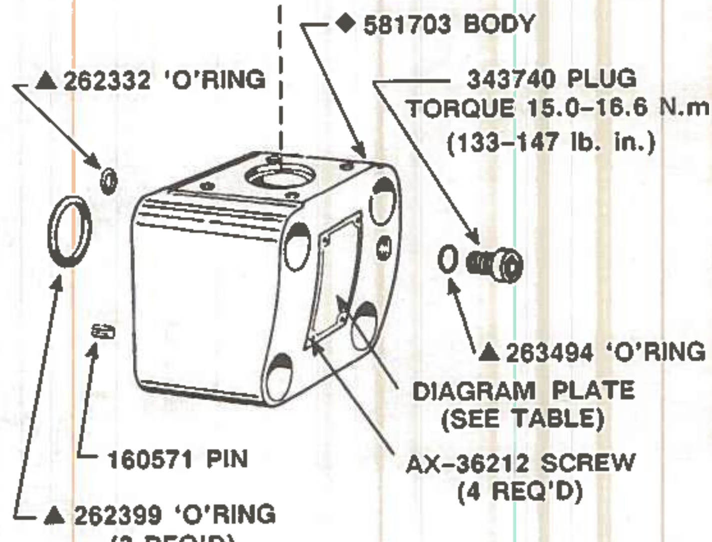
MODEL	■ COVER	■ PLUG/'O'RING (2 REQ'D)	■ PLUG/'O'RING
C*19-(H)100A-90	422852	———	———
C*19-(H)101A-90	424204	343740/ ▲263494	398071/ ▲263492
C*19-(H)102A-90			
C*19-(H)10*C-90			

NOTE
PARTS PREFIXED WITH A SYMBOL ARE AVAILABLE ONLY IN KITS.

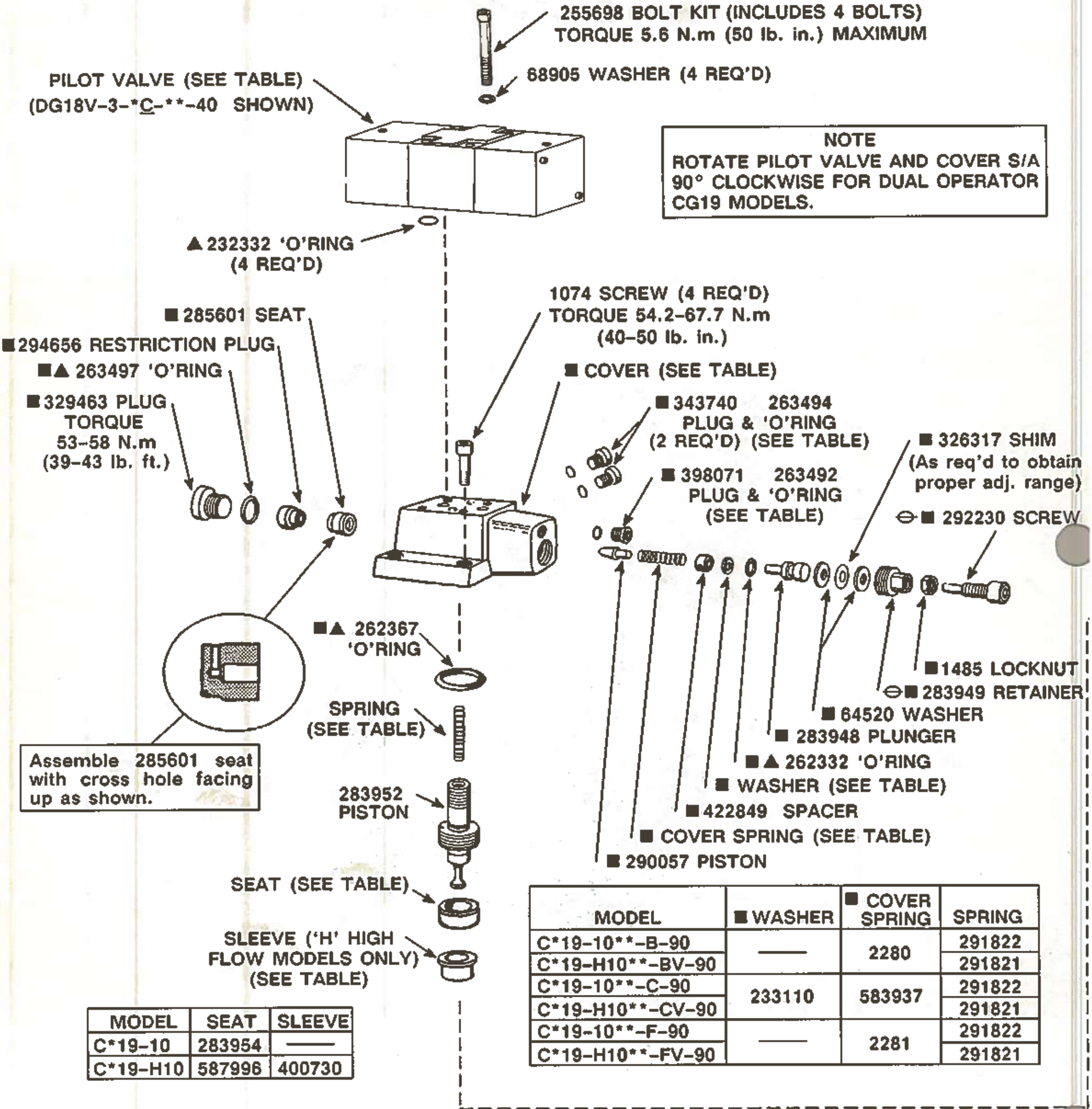
■ INCLUDED IN COVER S/A
▲ INCLUDED IN F3 SEAL KIT 920346 (INCLUDES PILOT VALVE SEALS)
⊖ LUBRICATE WITH OIL BEFORE ASSEMBLY
◆ NOT AVAILABLE FOR SALE



◆ BODY	MODEL
580430	CS19-(H)10**-*(V)-90
590300	CT19-10**-*-90



CG19-(H)10**-*(V)-90



MODEL	■ WASHER	■ COVER SPRING	SPRING
C*19-10**-B-90	——	2280	291822
C*19-H10**-BV-90			291821
C*19-10**-C-90	233110	583937	291822
C*19-H10**-CV-90			291821
C*19-10**-F-90	——	2281	291822
C*19-H10**-FV-90			291821

MODEL	SEAT	SLEEVE
C*19-10	283954	——
C*19-H10	587996	400730

VICKERS®
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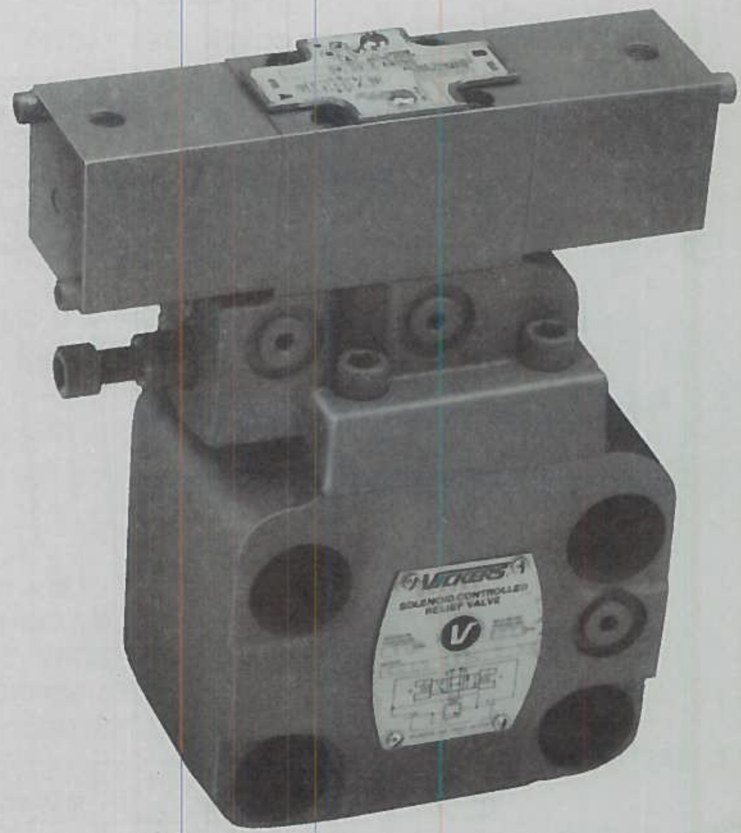
Service Parts Information

AIR CONTROLLED
RELIEF VALVES

(F3)-CG19-(H)06**(P)-*(V)-(***)-90
(F3)-CS19-(H)03/06**(P)-*(V)-(***)-90
(F3)-CT19-06**(P)-*-(***)-90



Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48084
Released 9-1-87
I-3428-S

MODEL CODE BREAKDOWN

(F3) – C * 5 – (H) 10 * * (L) (P) – * (V) – M – **** – 90

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

1 Seals for Mineral Oil & Fire Resistant Fluids
(Omit if not Required)

2 Relief Valve

3 Connections
- G – Subplate Mounting
- S – Straight Threads
- T – NPTF Threads

4 Solenoid Controlled

5 High Flow
CG5 or CS5 Models Only
(Omit if not Required)

6 Valve Size
1 1/4 inch

7 Pilot Valve Spool Type

8 Pilot Valve Function
- A – Spring Offset (Single Solenoid)
- B – Spring Centered (Sol. 'A' Removed)
- C – Spring Centered (Dual Solenoids)
- F – Spring Offset (Single Solenoid) Energize to Vent

9 Left Hand Built Single Solenoid Pilot Valve
(Omit if not Required)

10 Manual Operator for Single Solenoid Pilot Valve
(Omit if not Required)

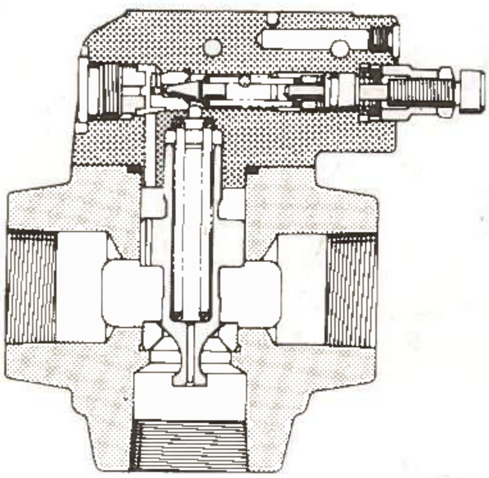
11 Pressure Range
- B – 125–1000 psi
- C – 500–2000 psi
- F – 1500–3000 psi

12 High Vent
(Omit if not Required)

13 Flag Symbol Heading for Pilot Valve Electrical Features

14 Pilot Valve Electrical Features
(Refer to Drawing I-3866-S & Pilot Valve Parts Drawing)

15 Design



RELIEF VALVE SECTIONAL VIEW WITHOUT PILOT VALVE

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS series filter series are recommended.

Litho in U.S.A

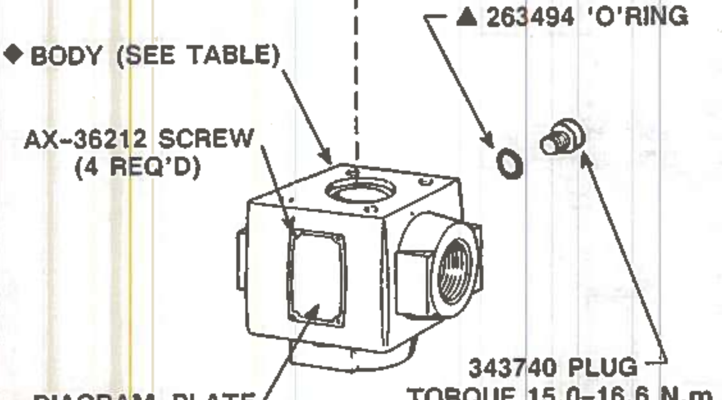
MODEL	DIAGRAM PLATE	PILOT VALVE	PILOT VALVE PARTS DRWG.
C*5 -(H)100A(P)-*(V)-M-***-90	422864	DG4V-3-0BL-M***-40	I-3862-S
C*5 -(H)101A(P)-*(V)-M-***-90	422865	DG4V-3-2AL-M***-40	I-3861-S
C*5 -(H)102A(P)-*(V)-M-***-90	423814	DG4V-3-2BL-M***-40	I-3862-S
C*5 -(H)100C-*(V)-M-***-90	422862	DG4V-3-0C-M***-40	I-3863-S
C*5 -(H)102C-*(V)-M-***-90	422863	DG4V-3-2C-M***-40	I-3863-S
C*5 -(H)100F(P)-*(V)-M-***-90	———	DG4V-3-0FL-M***-40	I-3864-S

MODEL	■ COVER S/A
C*5-(H)100A/F-B(V)-90	942456
C*5-(H)100A/F-C(V)-90	942457
C*5-(H)100A/F-F(V)-90	942458
C*5-(H)101A-B(V)-90	942459
C*5-(H)102A-B(V)-90	
C*5-(H)10*C-B(V)-90	
C*5-(H)101A-C(V)-90	942460
C*5-(H)102A-C(V)-90	
C*5-(H)10*C-C(V)-90	
C*5-(H)101A-F(V)-90	942461
C*5-(H)102A-F(V)-90	
C*5-(H)10*C-F(V)-90	

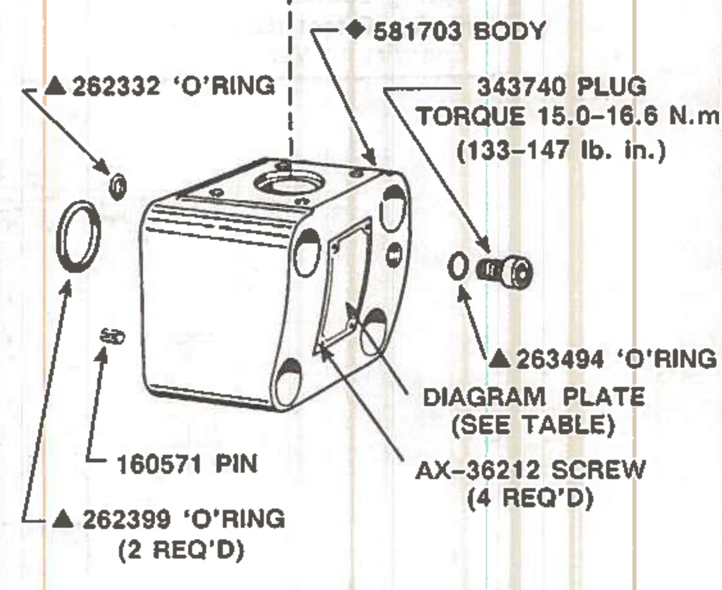
MODEL	■ COVER	■ PLUG/'O'RING (2 REQ'D)	■ PLUG/'O'RING
C*5-(H)100A-90	422852	———	———
C*5-(H)101A-90	424204	343740/ ▲263494	398071/ ▲263492
C*5-(H)102A-90			
C*5-(H)10*C-90			

NOTE
PARTS PREFIXED WITH A SYMBOL AVAILABLE ONLY IN KITS.

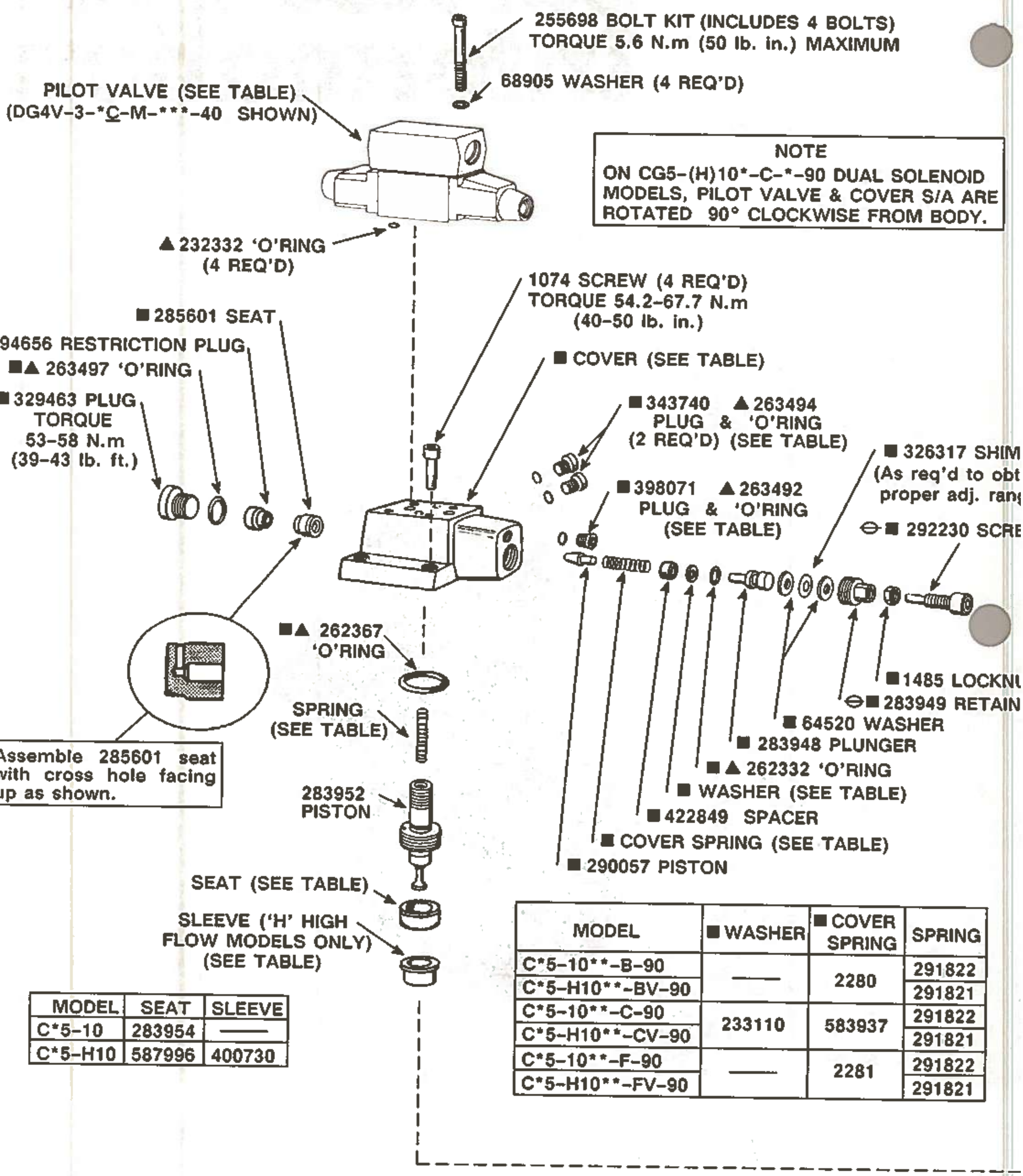
■ INCLUDED IN COVER S/A
▲ INCLUDED IN F3 SEAL KIT 920343 (INCLUDES PILOT VALVE SEALS)
⊖ LUBRICATE WITH OIL BEFORE ASSEMBLY
◆ NOT AVAILABLE FOR SALE



◆ BODY	MODEL
580430	CS5-(H)10**-*(V)-90
590300	CT5-10**-*-90



CG5-(H)10**-*(V)-90



NOTE
ON CG5-(H)10*-C-*-90 DUAL SOLENOID MODELS, PILOT VALVE & COVER S/A ARE ROTATED 90° CLOCKWISE FROM BODY.

Assemble 285601 seat with cross hole facing up as shown.

MODEL	SEAT	SLEEVE
C*5-10	283954	——
C*5-H10	587996	400730

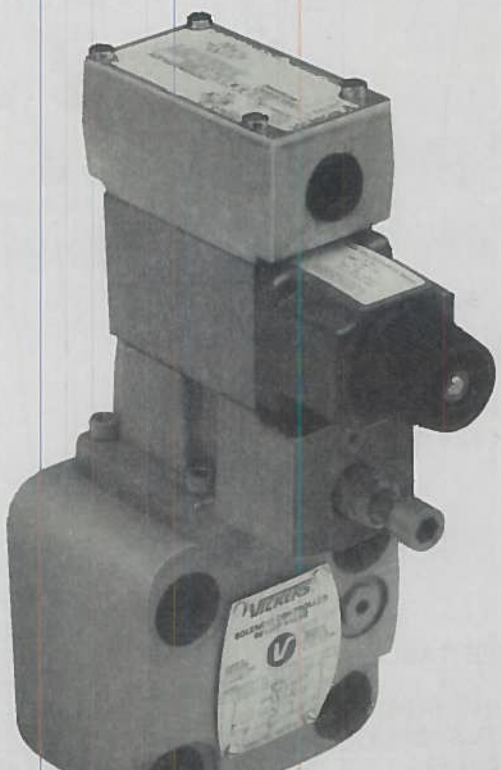
MODEL	■ WASHER	■ COVER SPRING	SPRING
C*5-10**-B-90	——	2280	291822
C*5-H10**-BV-90			291821
C*5-10**-C-90	233110	583937	291822
C*5-H10**-CV-90			291821
C*5-10**-F-90	——	2281	291822
C*5-H10**-FV-90			291821

VICKERS®
A TRINOVA COMPANY

Service Parts Information

SOLENOID
CONTROLLED
RELIEF VALVES

(F3)-CG5-(H)10**(L)(P)-*(V)-M-****-90
(F3)-CS5-(H)10**(L)(P)-*(V)-M-****-90
(F3)-CT5-10**(L)(P)-*-M-****-90



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Released 9-1-87

I-3427-S

MODEL CODE BREAKDOWN

(F3) - C * 5 - (H) ** * * (L) (P) - * (V) - M - **** - 90

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

1 Seals for Mineral Oil & Fire Resistant Fluids (Omit if not Required)

2 Relief Valve

3 Connections

- G – Subplate Mounting
- S – Straight Threads
- T – NPTF Threads

4 Solenoid Controlled

5 High Flow — CG5 or CS5 Models Only (Omit if not Required)

6 Valve Size

- 03 – 3/8 inch
- 06 – 3/4 inch

7 Pilot Valve Spool Type

8 Pilot Valve Function

- A – Spring Offset (Single Solenoid)
- B – Spring Centered (Sol. 'A' Removed)
- C – Spring Centered (Dual Solenoids)
- F – Spring Offset (Single Solenoid) Energize to Vent

9 Left Hand Built Single Solenoid Pilot Valve (Omit if not Required)

10 Manual Operator for Single Solenoid Pilot Valve (Omit if not Required)

11 Pressure Range

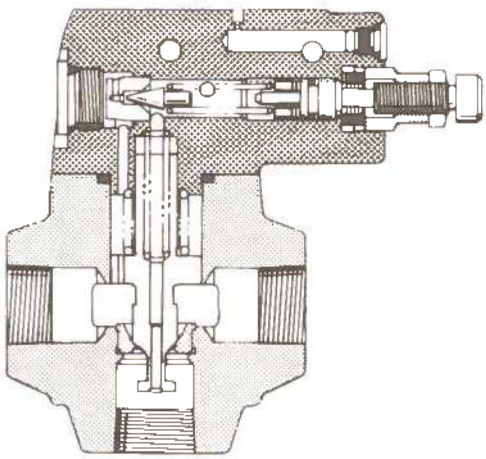
- B – 125-1000 psi
- C – 500-2000 psi
- F – 1500-3000 psi

12 High Vent (Omit if not Required)

13 Flag Symbol Heading for Pilot Valve Electrical Features

14 Pilot Valve Electrical Features (Refer to Drawing I-3866-S & Pilot Valve Parts Drawing)

15 Design



RELIEF VALVE SECTIONAL VIEW WITHOUT PILOT VALVE

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

Litho in U.S.A.

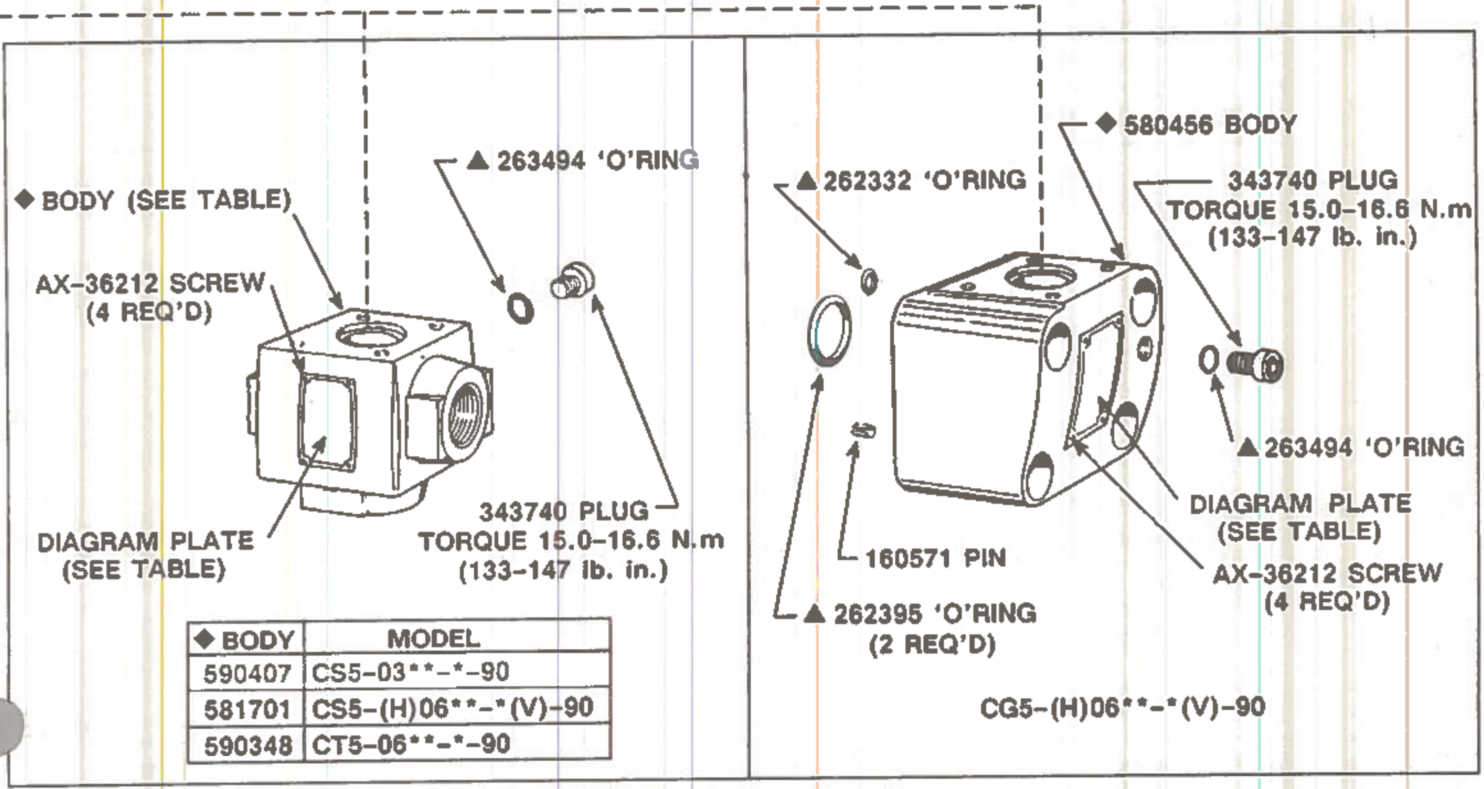
MODEL	DIAGRAM PLATE	PILOT VALVE	PILOT VALVE PARTS DRWG.
C*5 -(H)0*0A(P)-*(V)-M-***-90	422864	DG4V-3-0BL-M***-40	I-3862-S
C*5 -(H)0*1A(P)-*(V)-M-***-90	422865	DG4V-3-2AL-M***-40	I-3861-S
C*5 -(H)0*2A(P)-*(V)-M-***-90	423814	DG4V-3-2BL-M***-40	I-3862-S
C*5 -(H)0*0C-*(V)-M-***-90	422862	DG4V-3-0C-M***-40	I-3863-S
C*5 -(H)0*2C-*(V)-M-***-90	422863	DG4V-3-2C-M***-40	I-3863-S
C*5 -(H)0*0F(P)-*(V)-M-***-90	477211	DG4V-3-0FL-M***-40	I-3864-S

MODEL	■ COVER S/A
C*5-(H)0*0A/F-B(V)-90	942432
C*5-(H)0*0A/F-C(V)-90	942433
C*5-(H)0*0A/F-F(V)-90	942434
C*5-(H)0*1A-B(V)-90	942435
C*5-(H)0*2A-B(V)-90	
C*5-(H)0**C-B(V)-90	
C*5-(H)0*1A-C(V)-90	942436
C*5-(H)0*2A-C(V)-90	
C*5-(H)0**C-C(V)-90	
C*5-(H)0*1A-F(V)-90	942437
C*5-(H)0*2A-F(V)-90	
C*5-(H)0**C-F(V)-90	

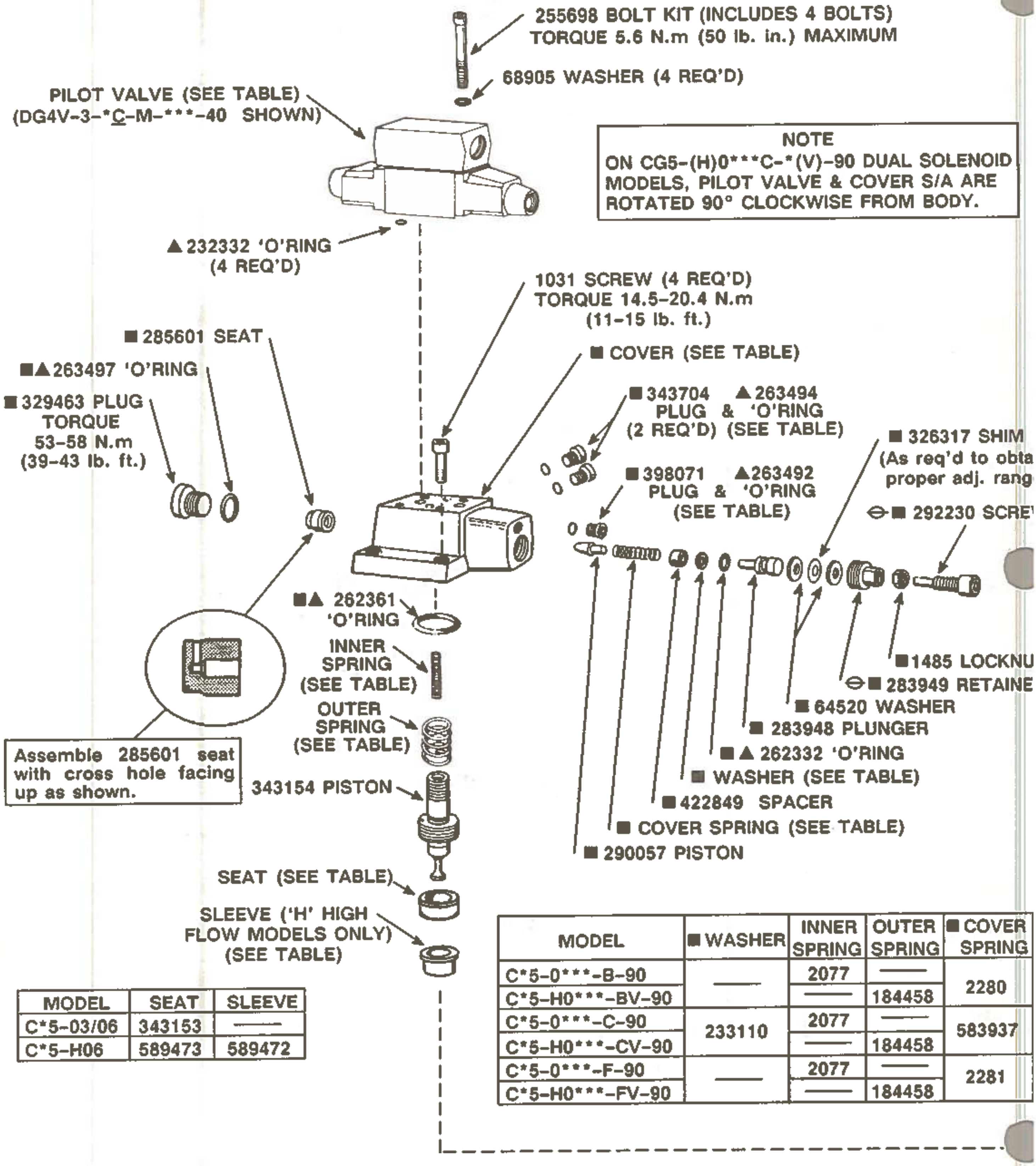
MODEL	■ COVER	■ PLUG/'O'RING (2 REQ'D)	■ PLUG/'O'RING
C*5-(H)0*0A-90	422828	———	———
C*5-(H)0*1A-90	424203	343740/ ▲263494	398071/ ▲263492
C*5-(H)0*2A-90			
C*5-(H)0**C-90			

NOTE
PARTS PREFIXED WITH A SYMBOL AVAILABLE ONLY IN KITS.

- ■ INCLUDED IN COVER S/A
- ▲ INCLUDED IN F3 SEAL KIT 920344 (INCLUDES PILOT VALVE SEALS)
- ⊖ LUBRICATE WITH OIL BEFORE ASSEMBLY
- ◆ NOT AVAILABLE FOR SALE



◆ BODY	MODEL
590407	CS5-03**-*-90
581701	CS5-(H)06**-*(V)-90
590348	CT5-06**-*-90



MODEL	■ WASHER	INNER SPRING	OUTER SPRING	■ COVER SPRING
C*5-0***-B-90	——	2077	——	2280
C*5-H0***-BV-90		——	184458	
C*5-0***-C-90	233110	2077	——	583937
C*5-H0***-CV-90		——	184458	
C*5-0***-F-90	——	2077	——	2281
C*5-H0***-FV-90		——	184458	

MODEL	SEAT	SLEEVE
C*5-03/06	343153	——
C*5-H06	589473	589472

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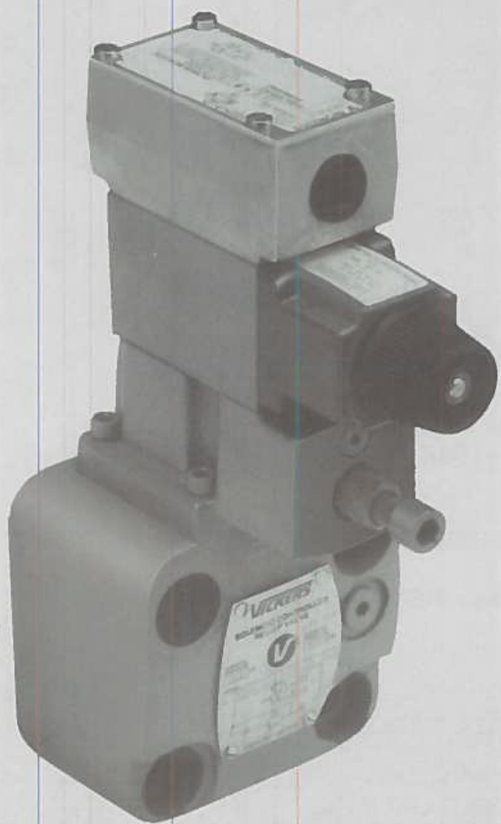
Service Parts Information

SOLENOID CONTROLLED RELIEF VALVES

(F3)-CG5-(H)06**(L)(P)-*(V)-M-****-90
(F3)-CS5-(H)03/06**(L)(P)-*(V)-M-****-90
(F3)-CT5-06**(L)(P)-*-M-****-90



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Released 9-1-87
I-3426-S

MODEL CODE BREAKDOWN

(F3) – DGC5 06 0A (P) – * (V) – M (P**) – ** – * – 70

1 2 3 4 5 6 7 8 9 10 11 12

1 — Mineral Oil & Fire Resistant Seals

2 — Solenoid Controlled Relief Valve Module

3 — Valve Size (3/4 Inch)

4 — Pilot Valve Spool Type & Function

5 — Manual Override in Pilot Valve (Omit if not required)

6 — Pressure Range
B – 125-1000 PSI
C – 500-2000 PSI
F – 1500-3000 PSI

7 — High Vent Option (Omit if not required)

8 — Flag Symbol Heading for Electrical Features & Options at Pilot Valve

9 — Electrical Features (Refer to drawing I-3866-S)

10 — Electrical Connector Options
U – DIN 43650
W – 1/2'' NPT
WL – 1/2'' NPT with Solenoid Indicator Light

11 — Coil Voltage I.D. Letter Code (Refer to drawing I-3866-S)

12 — Design Number

† AVAILABLE IN LOT KITS OF 25			
ITEM	LOT KIT	ITEM	LOT KIT
1485 NUT	944064	292230 SCREW	944072
36212 SCREW	944053	233110 WASHER	944076
64520 WASHER	944068	326317 WASHER	944073
68905 WASHER	944077	329463 PLUG	944041
199312 PIN	944059	343740 PLUG	944038
		422849 SPACER	944075

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

Service Parts Information

VICKERS
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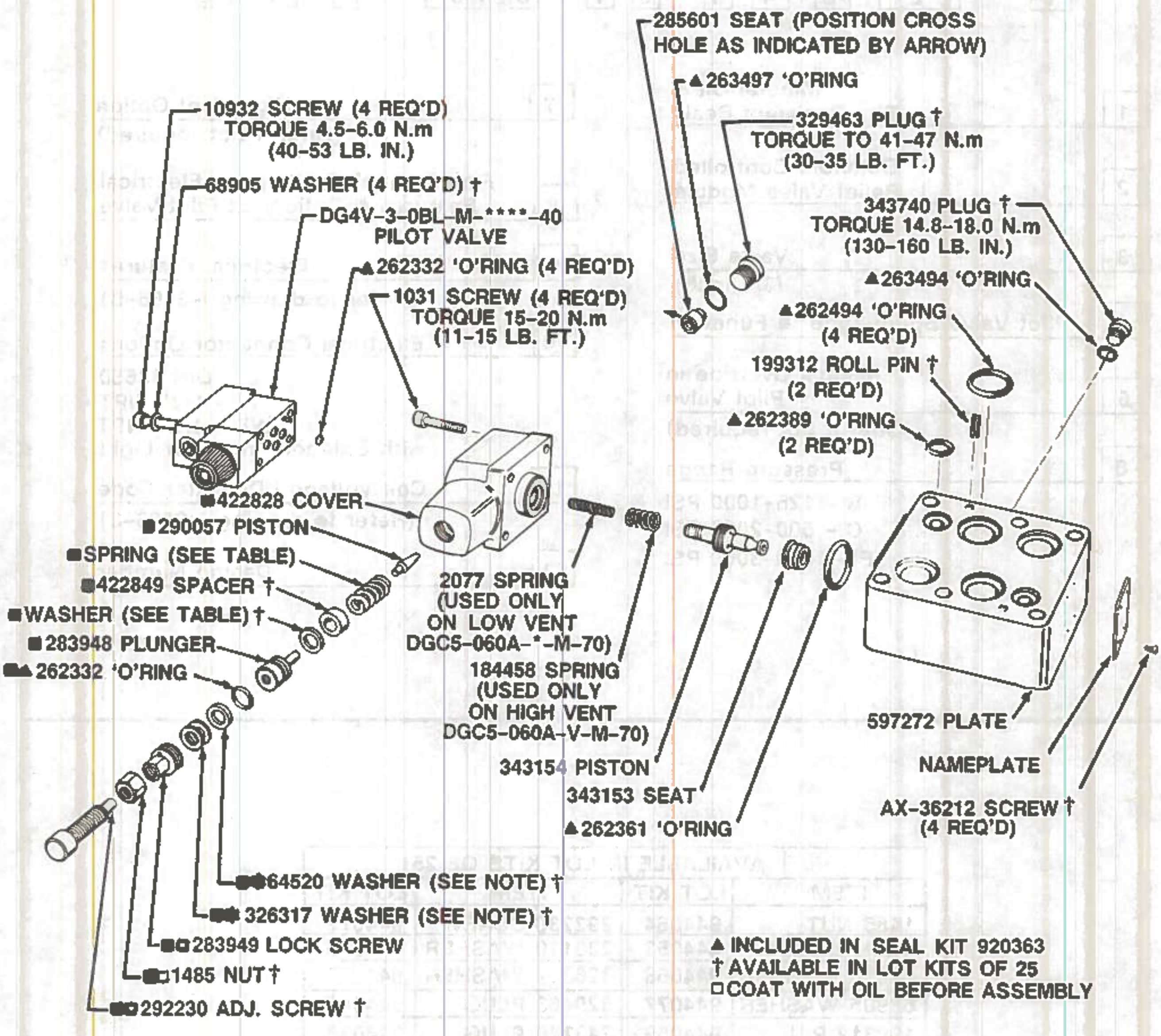
SOLENOID CONTROLLED RELIEF VALVE MODULE

(F3)-DGC5-060A(P)-*(V)-M(P**)-**-*-70



▲ INCLUDED IN SEAL KIT 920363
† AVAILABLE IN LOT KITS OF 25
□ COAT WITH OIL BEFORE ASSEMBLY

MODEL	■INCLUDED IN COVER S/A	SPRING	WASHER
DGC5-060A-B-*-M-70	926570	2280	OMIT
DGC5-060A-C-*-M-70	926571	583937	233110
DGC5-060A-F-*-M-70	926572	2281	OMIT

✱ NOTE
USE AS REQUIRED TO OBTAIN PROPER ADJUSTMENT RANGE.

REFER TO I-3862-S FOR PILOT VALVE PARTS BREAKDOWN

MODEL CODE BREAKDOWN

C	G	03	B	(V)	10
1	2	3	4	5	6

1 RELIEF VALVE

2 MOUNTING TYPE

G – Manifold or Subplate

3 VALVE SIZE

03 – 3/8'' Nominal Size

4 PRESSURE RANGE

B – 75 – 1000 PSI
C – 500 – 2000 PSI
F – 1500 – 3000 PSI

5 HIGH VENT SPRING

Omit if not required

6 DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

Litho in U.S.A.

Service Parts Information

VICKERS
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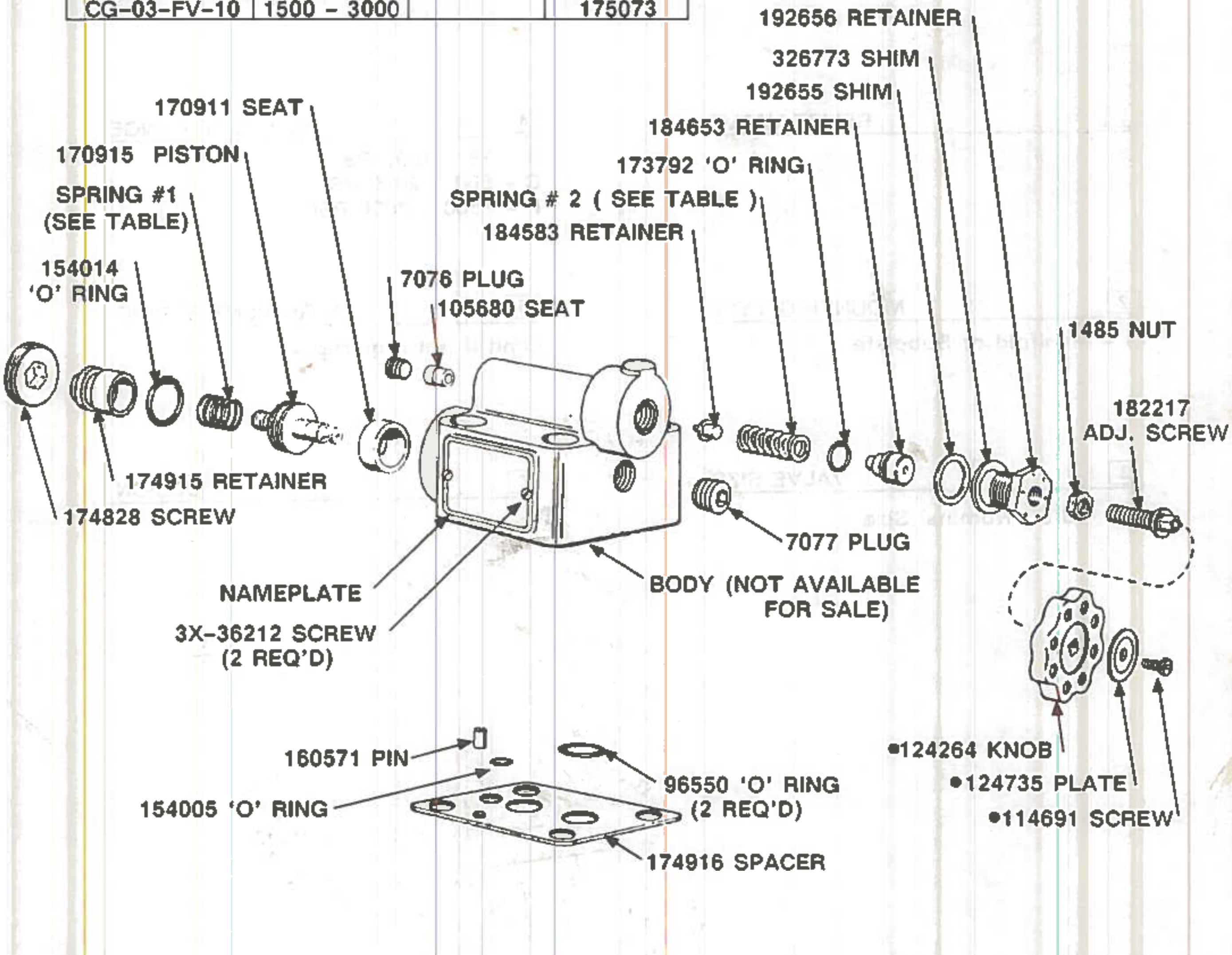
HIGH PRESSURE
RELIEF VALVES

CG-03-**-10

MODEL	PRESSURE RANGE	SPRING #1	SPRING #2
CG-03-B-10	90 - 1000	175070	175071
CG-03-C-10	500 - 2000		175072
CG-03-F-10	1500 - 3000		175073
CG-03-BV-10	75 - 1000	184458	175071
CG-03-CV-10	500 - 2000		175072
CG-03-FV-10	1500 - 3000		175073



• Models with handwheel controls are available. Specify in model number by adding suffix -S81. Example: CG-03-*-10-S81

MODEL CODE BREAKDOWN

(F3) CG – H10 – * V – 30

- **(F3)** — MULTI-FLUID CAPABILITY (VITON SEALS)
- **C** — RELIEF VALVE
- **G** — MANIFOLD OR SUBPLATE MOUNTED
- **H10** — SIZE
  - H10 - $1\frac{1}{4}$ INCH HIGH FLOW
- ***** — PRESSURE RANGE
  - B - 125-1000 PSI
  - C - 500-2000 PSI
  - F - 1500-3000 PSI
- **V** — VENT PRESSURE
  - V - HIGH VENT PRESSURE
- **30** — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

BALANCED PISTON TYPE HIGH FLOW RELIEF VALVE

CG-H10-*V-30

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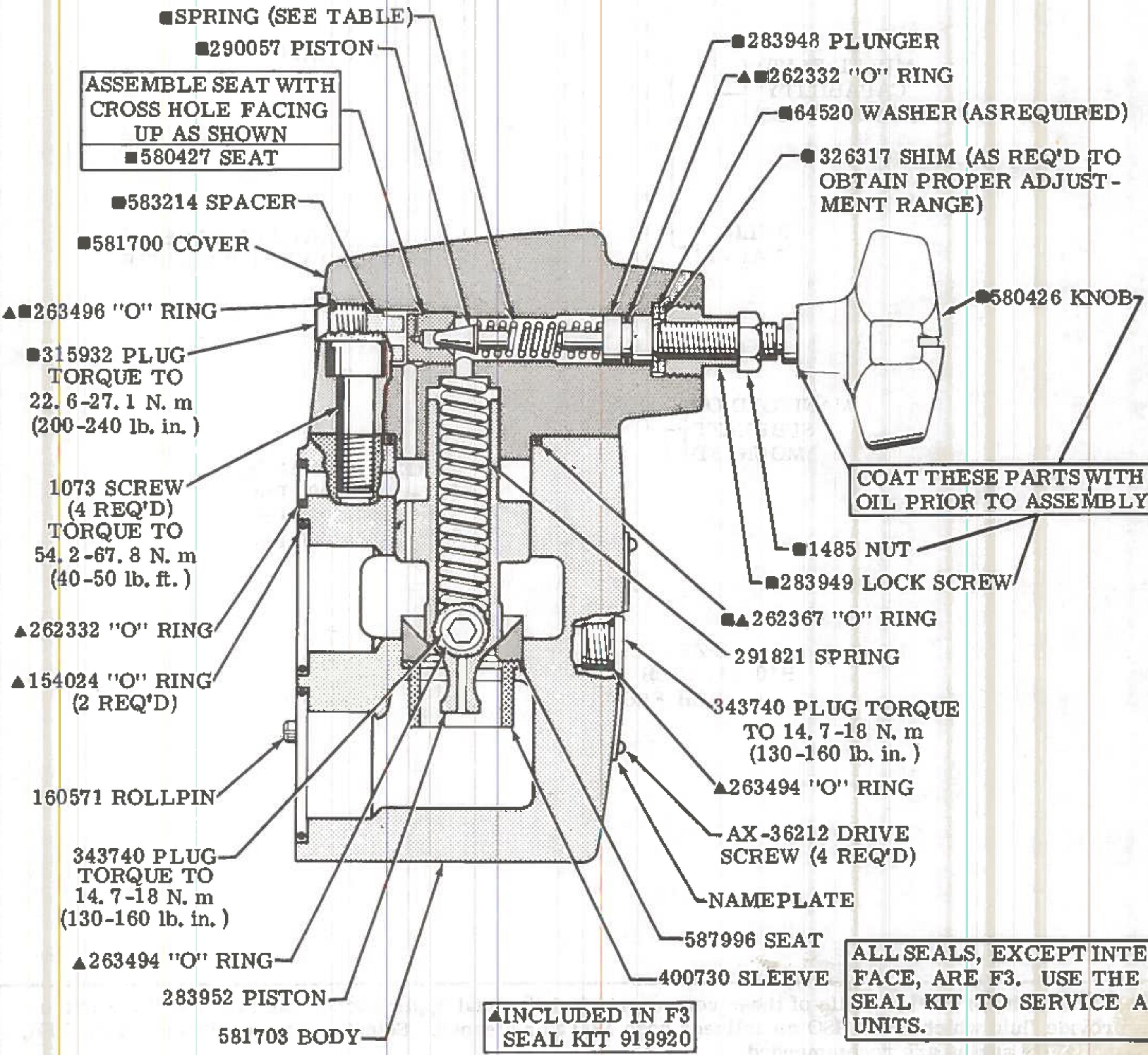
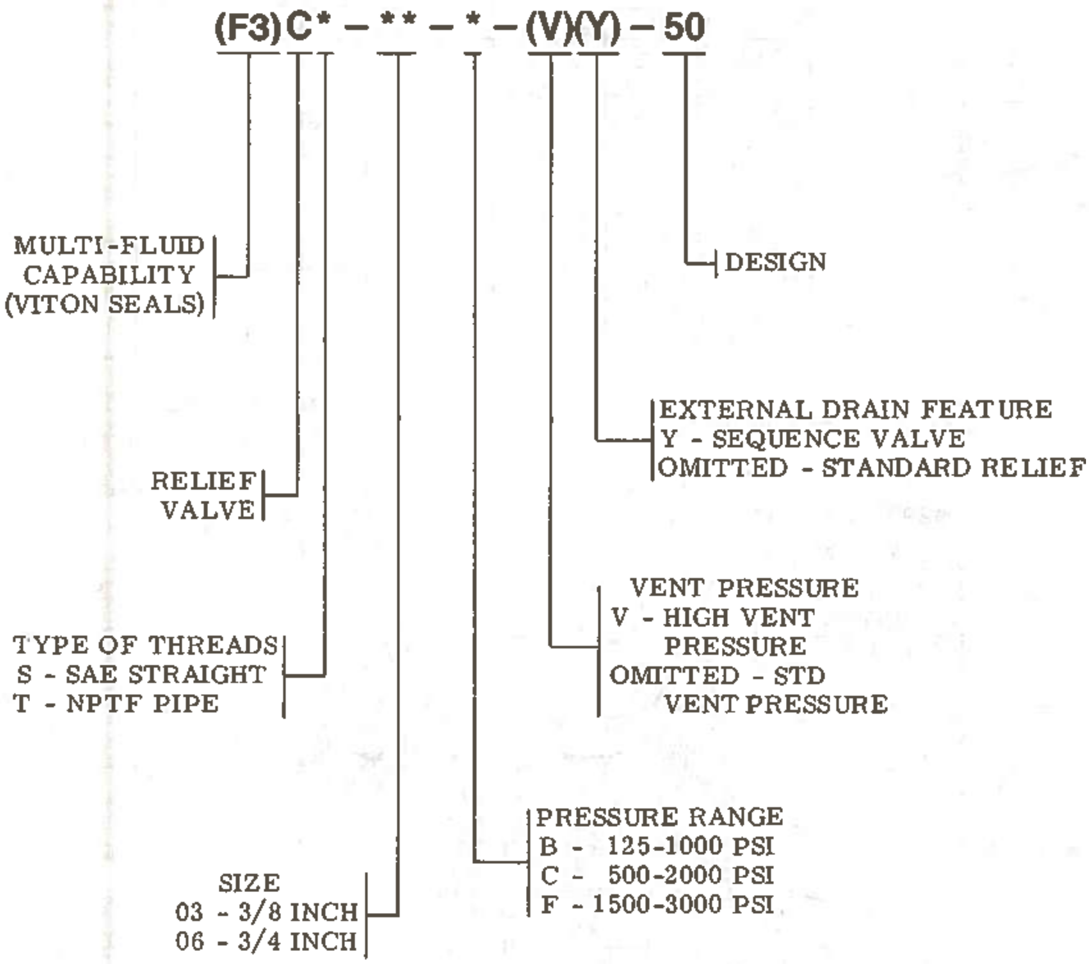
MODEL	■ SPRING	PRESSURE RANGE PSI	■INCLUDED IN COVER S/A KIT
CG-H10-BV-30	2280	125-1000	941286
CG-H10-CV-30	583937	500-2000	941287
CG-H10-FV-30	2281	1500-3000	941288



▲INCLUDED IN F3 SEAL KIT 919920

ALL SEALS, EXCEPT INTERFACE, ARE F3. USE THE F3 SEAL KIT TO SERVICE ALL UNITS.

MODEL CODE BREAKDOWN



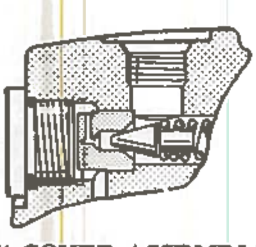
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

VICKERS®
A TRINOVA COMPANY

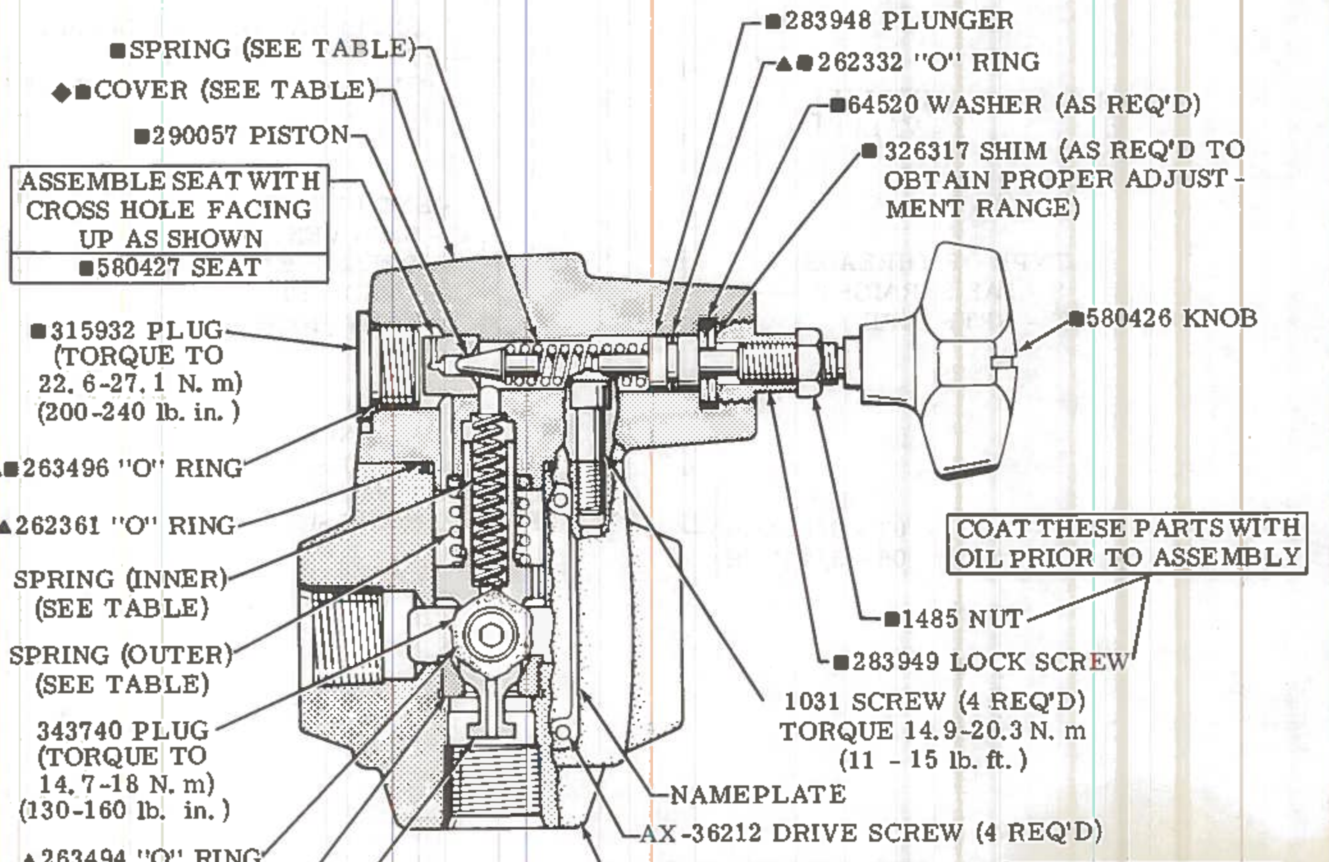
BALANCED PISTON TYPE RELIEF & SEQUENCE VALVES

(F3)C*-**-*-(V)(Y)-50



"Y" COVER ASSEMBLY (SEE TABLE)

MODEL	■ COVER	SPRING (OUTER)	SPRING (INNER)	■ SPRING	PRESSURE RANGE PSI	■ INCLUDED IN COVER S/A
C*-0*-B-50	581702		2077	2280	125-1000	941280
C*-0*-BV-50		184458				
C*-0*-BVY-50	590307					941283
C*-0*-BY-50			2077			
C*-0*-C-50	581702			583937	500-2000	941281
C*-0*-CV-50		184458				
C*-0*-CVY-50	590307					941284
C*-0*-CY-50			2077			
C*-0*-F-50	581702			2281	1500-3000	941282
C*-0*-FV-50		184458				
C*-0*-FVY-50	590307					941285
C*-0*-FY-50			2077			



MODEL	◆BODY
CS-03-*(V)-50	590407
CS-06-*(V)(Y)-50	581701
CT-06-*(V)(Y)-50	590348

◆NOT AVAILABLE FOR SALE AS INDIVIDUAL PARTS

▲INCLUDED IN F3 SEAL KIT 919922

MODEL CODE BREAKDOWN

(F3) CG – 06 * (V) (Y) – 50

- (F3) — MULTI-FLUID CAPABILITY (VITON SEALS)
- C — RELIEF VALVE
- G — MANIFOLD OR SUBPLATE MOUNTED
- 06 — SIZE: 06 - 3/4 INCH
- * — PRESSURE RANGE:
  - B - 125-1000 PSI
  - C - 500-2000 PSI
  - F - 1500-3000 PSI
- (V) — VENT PRESSURE:
  - V - HIGH VENT PRESSURE
  - OMITTED - STD VENT PRESSURE
- (Y) — EXTERNAL DRAIN FEATURE:
  - Y - SEQUENCE VALVE
  - OMITTED - RELIEF VALVE
- 50 — DESIGN

To insure sustained efficiency and maximum trouble-free life of this precision equipment, initial and continuous filtration of the fluid medium to 25 microns absolute or less is essential. (For information pertaining to Sperry Vickers economical filters, see bulletin 81-216.)

Litho in U. S. A.

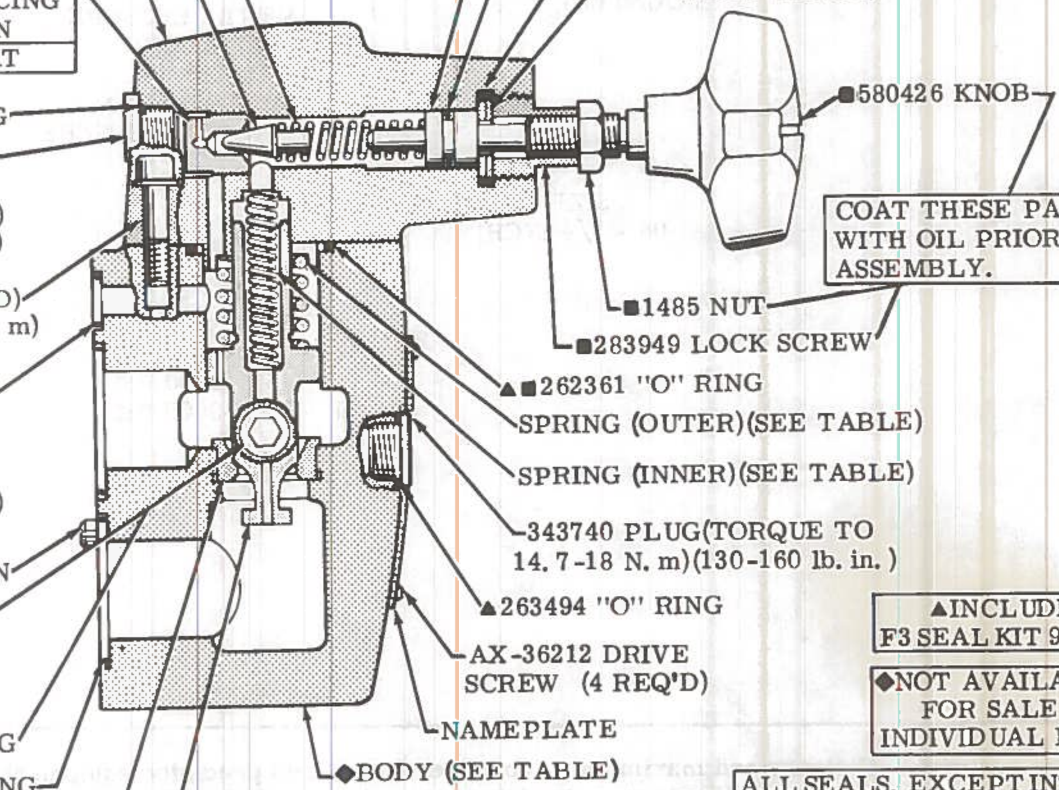
Service Parts Information

VICKERS
A TRINOVA COMPANY

BALANCED PISTON TYPE RELIEF & SEQUENCE VALVES

CG-06-*(V)(Y)-50

MODEL	■ COVER	SPRING (OUTER)	SPRING (INNER)	■ SPRING	PRESSURE RANGE PSI	■ INCLUDED IN COVER S/A
CG-06-B-50	581702		2077	2280	125-1000	941280
CG-06-BV-50	581702	184458		2280	125-1000	941280
CG-06-BVY-50	590315	184458		2280	125-1000	941283
CG-06-BY-50	590315		2077	2280	125-1000	941283
CG-06-C-50	581702		2077	583937	500-2000	941281
CG-06-CV-50	581702	184458		583937	500-2000	941281
CG-06-CVY-50	590315	184458		583937	500-2000	941284
CG-06-CY-50	590315		2077	583937	500-2000	941284
CG-06-F-50	581702		2077	2281	1500-3000	941282
CG-06-FV-50	581702	184458		2281	1500-3000	941282
CG-05-FVY-50	590315	184458		2281	1500-3000	941285
CG-06-FY-50	590315		2077	2281	1500-3000	941285



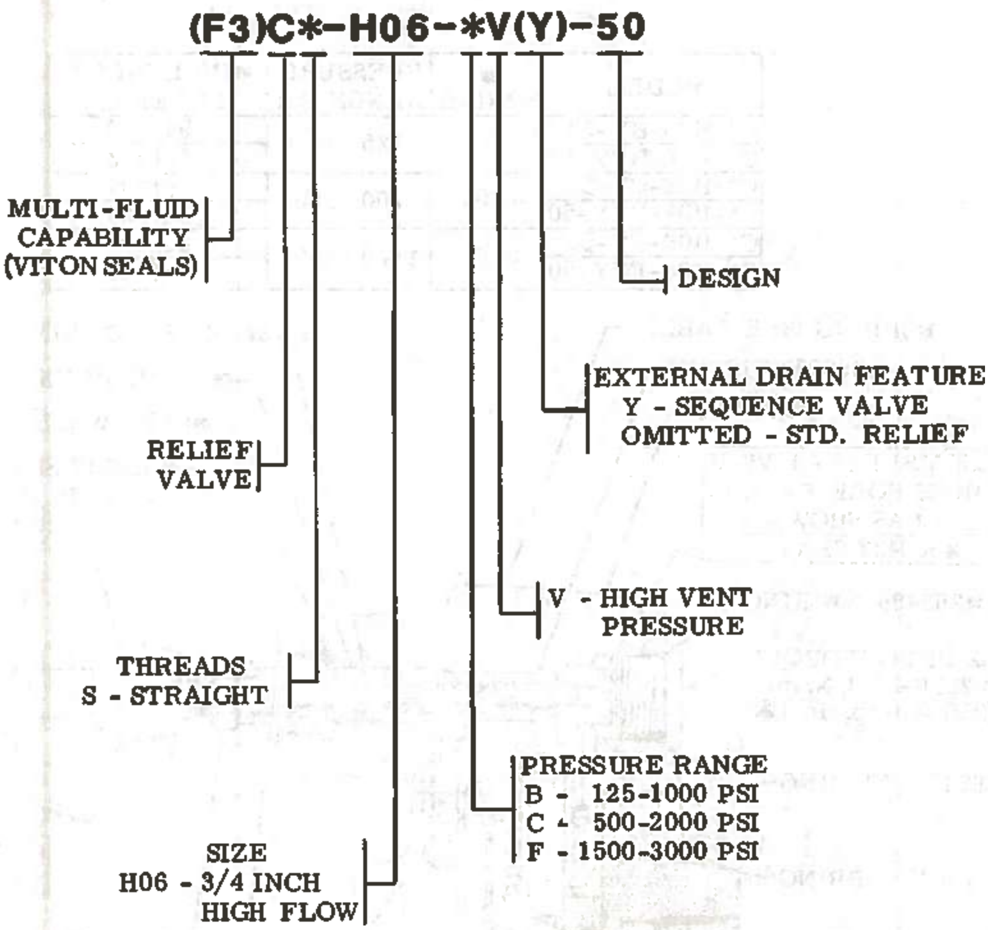
MODEL	BODY
CG-06-*(V)-50	580456
CG-06-*(V)Y-50	590350

▲INCLUDED IN F3 SEAL KIT 919444

◆NOT AVAILABLE FOR SALE AS INDIVIDUAL PART

ALL SEALS, EXCEPT INTERFACE, ARE F3. USE THE F3 SEAL KIT TO SERVICE ALL UNITS.

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

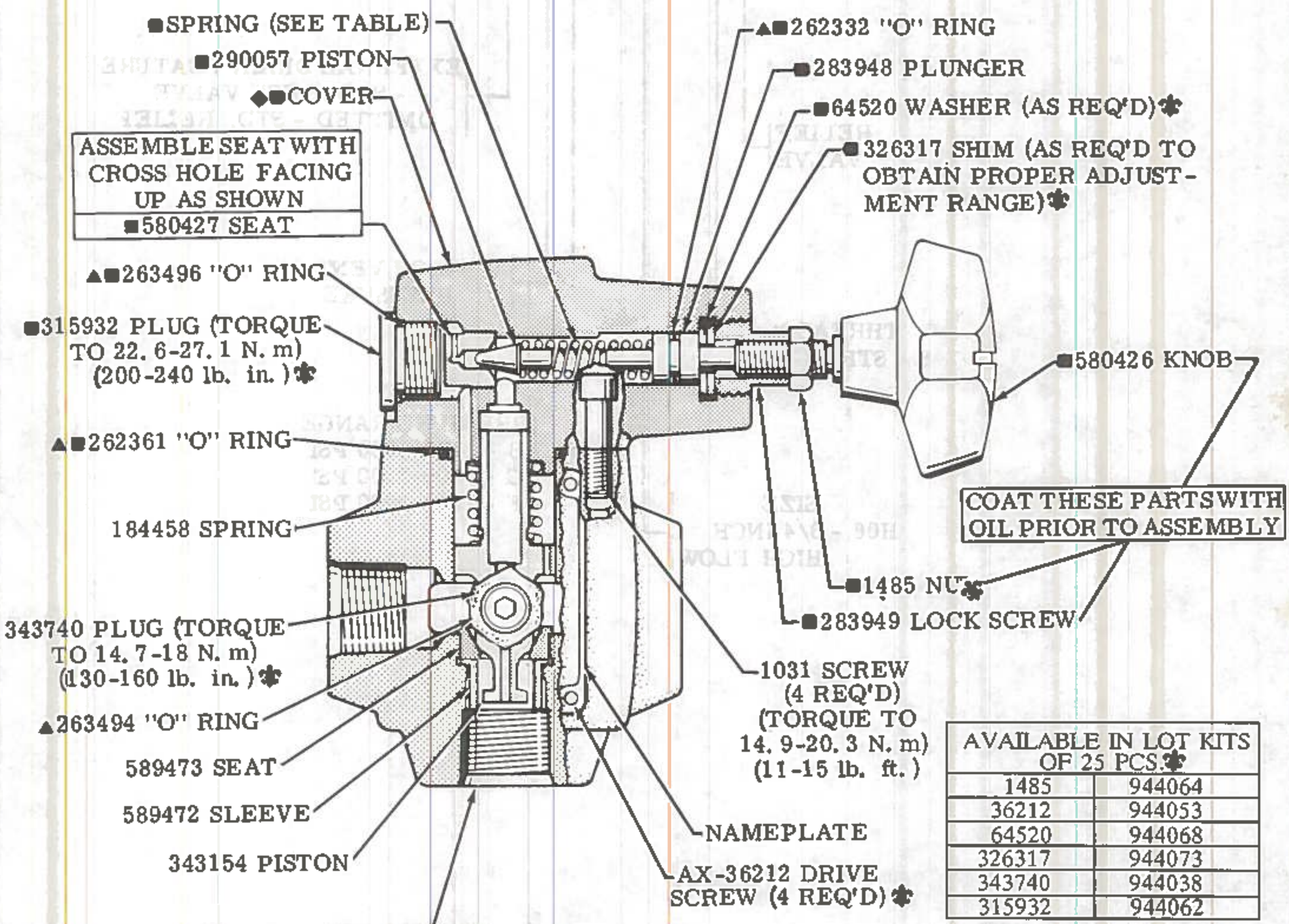
Service Parts Information

VICKERS
A TRINOVA COMPANY

BALANCED PISTON HIGH FLOW RELIEF & SEQUENCE VALVE

CS-H06-*V(Y)-50

MODEL	■ SPRING	PRESSURE RANGE PSI	■INCLUDED IN COVER S/A
C*-H06-BV-50	2280	125 - 1000	941280
C*-H06-BVY-50			941283
C*-H06-CV-50	583937	500 - 2000	941281
C*-H06-CVY-50			941284
C*-H06-FV-50	2281	1500 - 3000	941282
C*-H06-FVY-50			941285



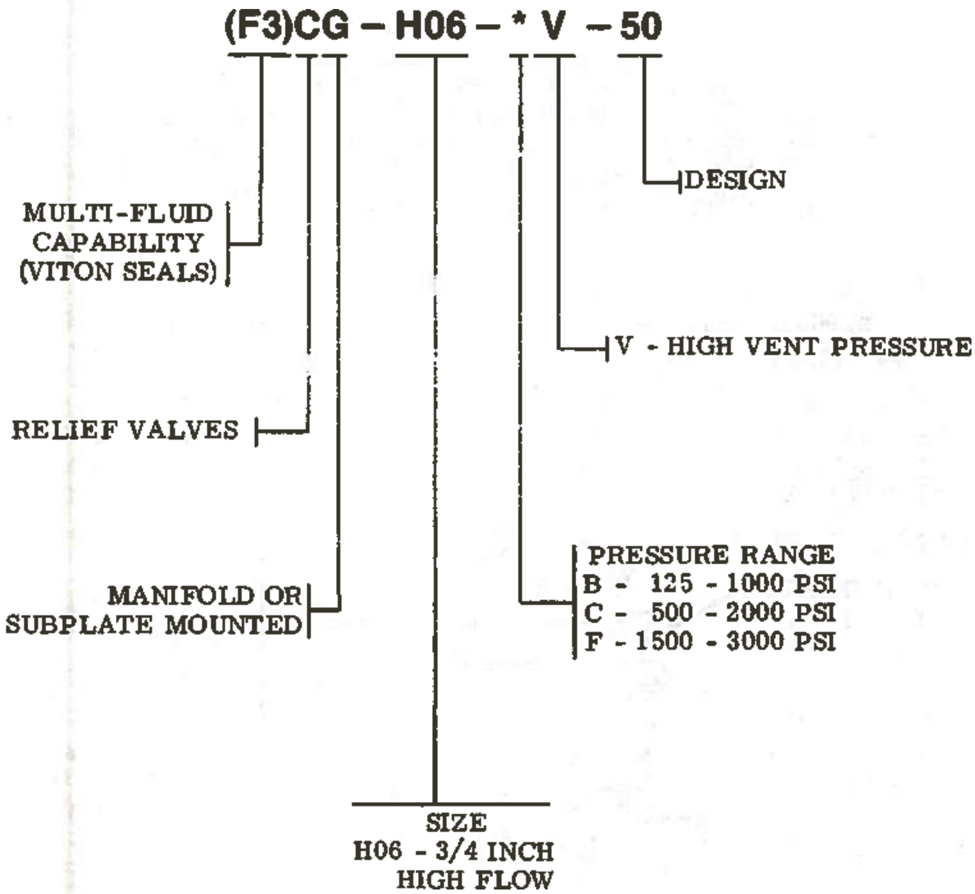
MODEL	◆BODY
CS-H06-*V-50	581701

AVAILABLE IN LOT KITS OF 25 PCS. ✽	
1485	944064
36212	944053
64520	944068
326317	944073
343740	944038
315932	944062

◆NOT AVAILABLE FOR SALE AS INDIVIDUAL ITEM

▲INCLUDED IN F3 SEAL KIT 919922

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

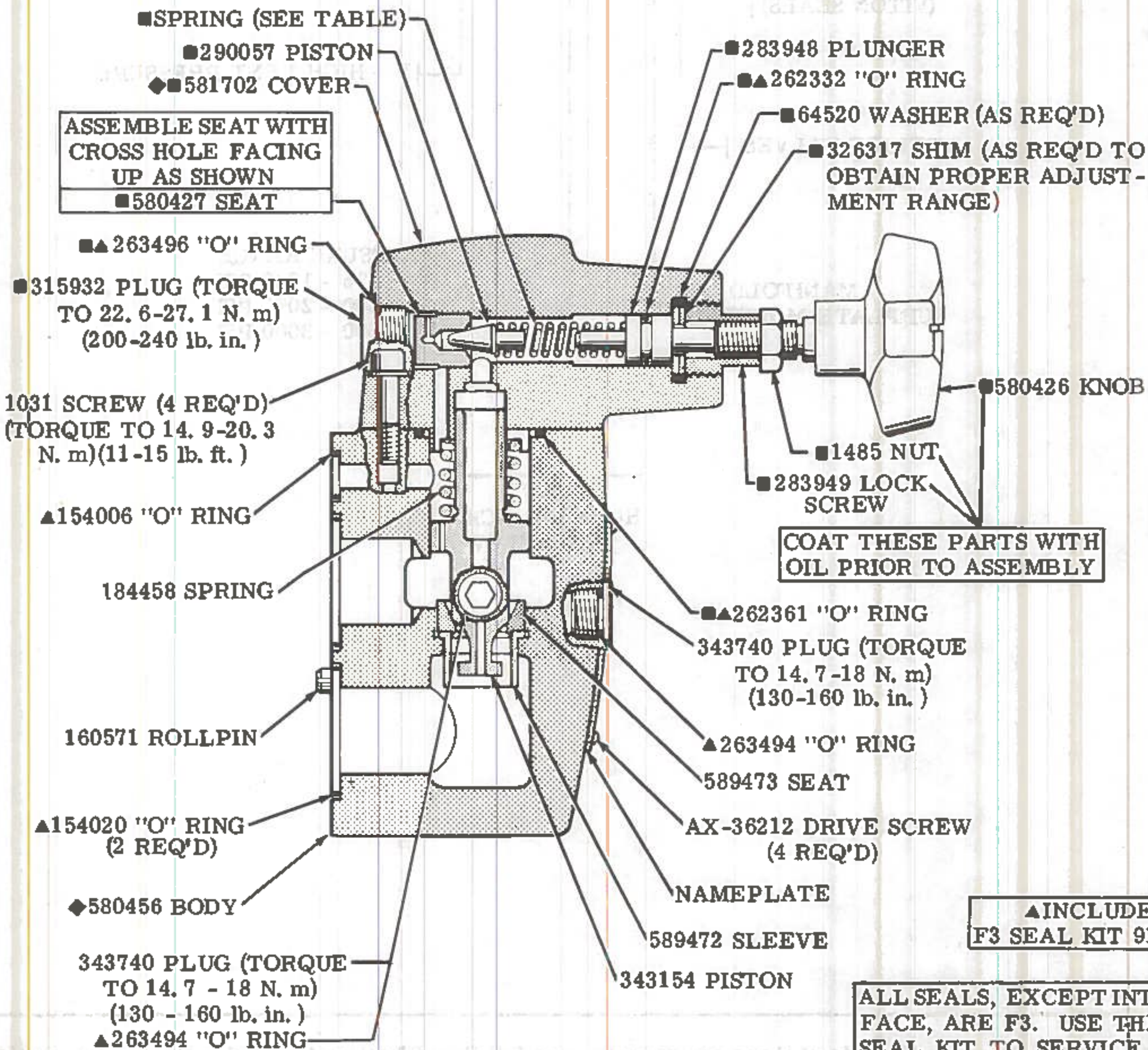
BALANCED PISTON TYPE RELIEF VALVES

CG-H06-BV-50
CG-H06-CV-50
CG-H06-FV-50

VICKERS
A TRINOVA COMPANY

MODEL	■ SPRING	PRESSURE RANGE PSI	■INCLUDED IN COVER S/A
CG-H06-BV-50	2280	125-1000	941280
CG-H06-CV-50	583937	500-2000	941281
CG-H06-FV-50	2281	1500-3000	941282

◆NOT AVAILABLE FOR SALE AS INDIVIDUAL PART

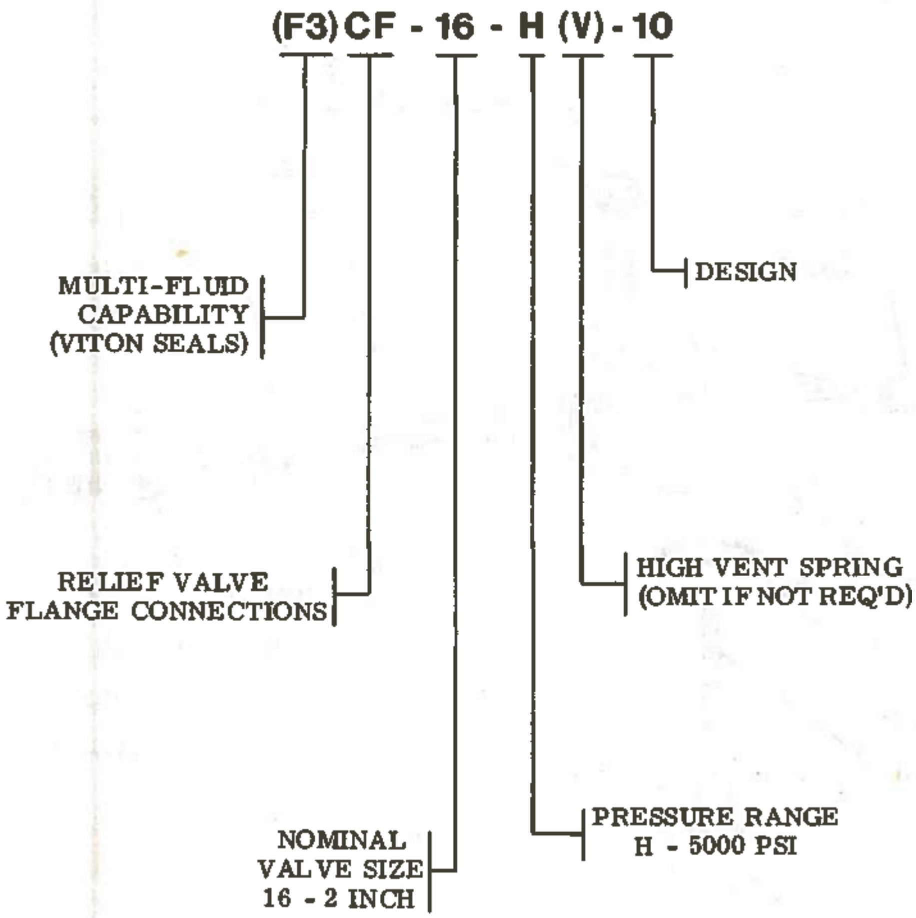


▲INCLUDED IN F3 SEAL KIT 919444

ALL SEALS, EXCEPT INTERFACE, ARE F3. USE THE F3 SEAL KIT TO SERVICE ALL UNITS.

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

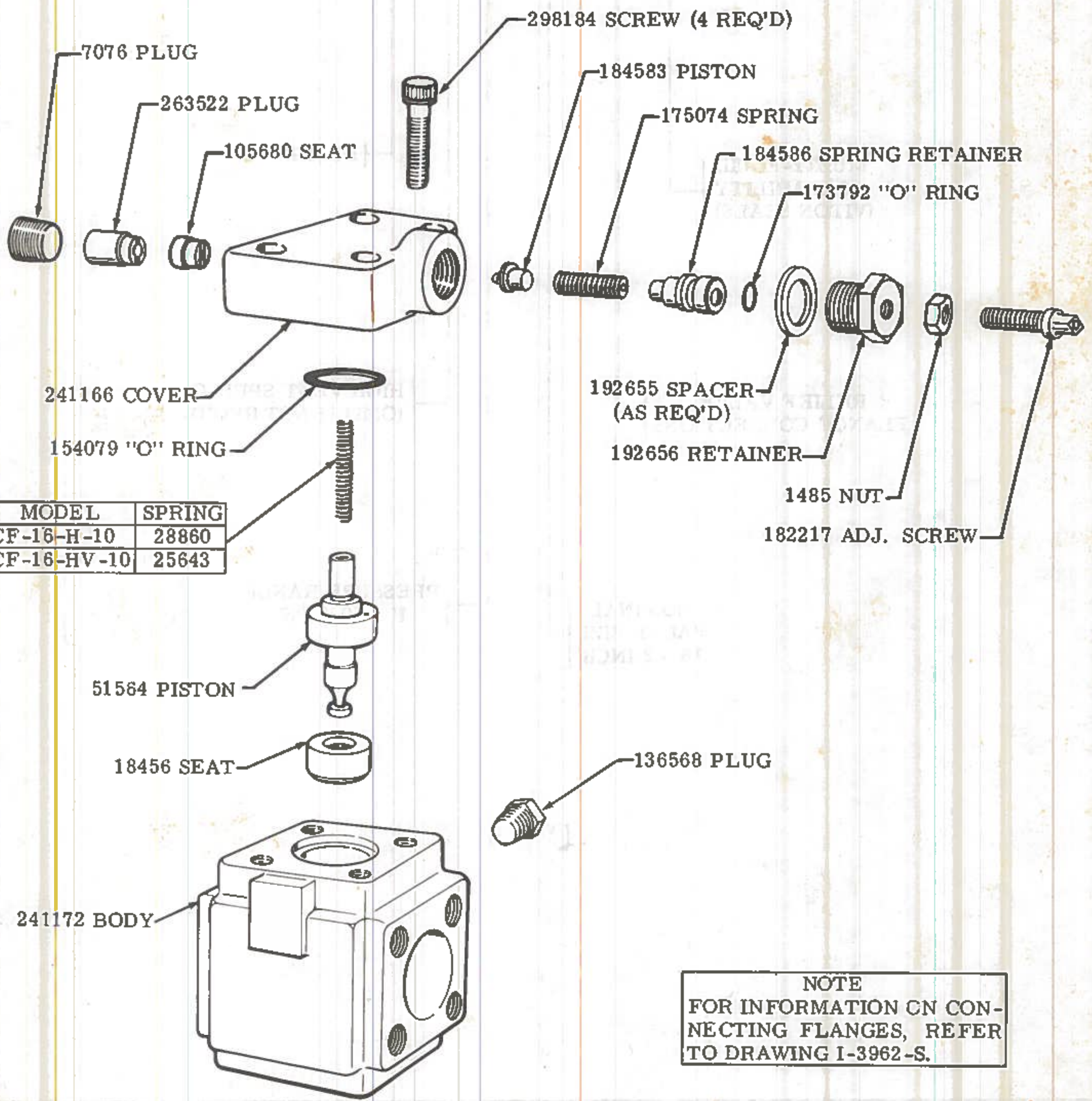


For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

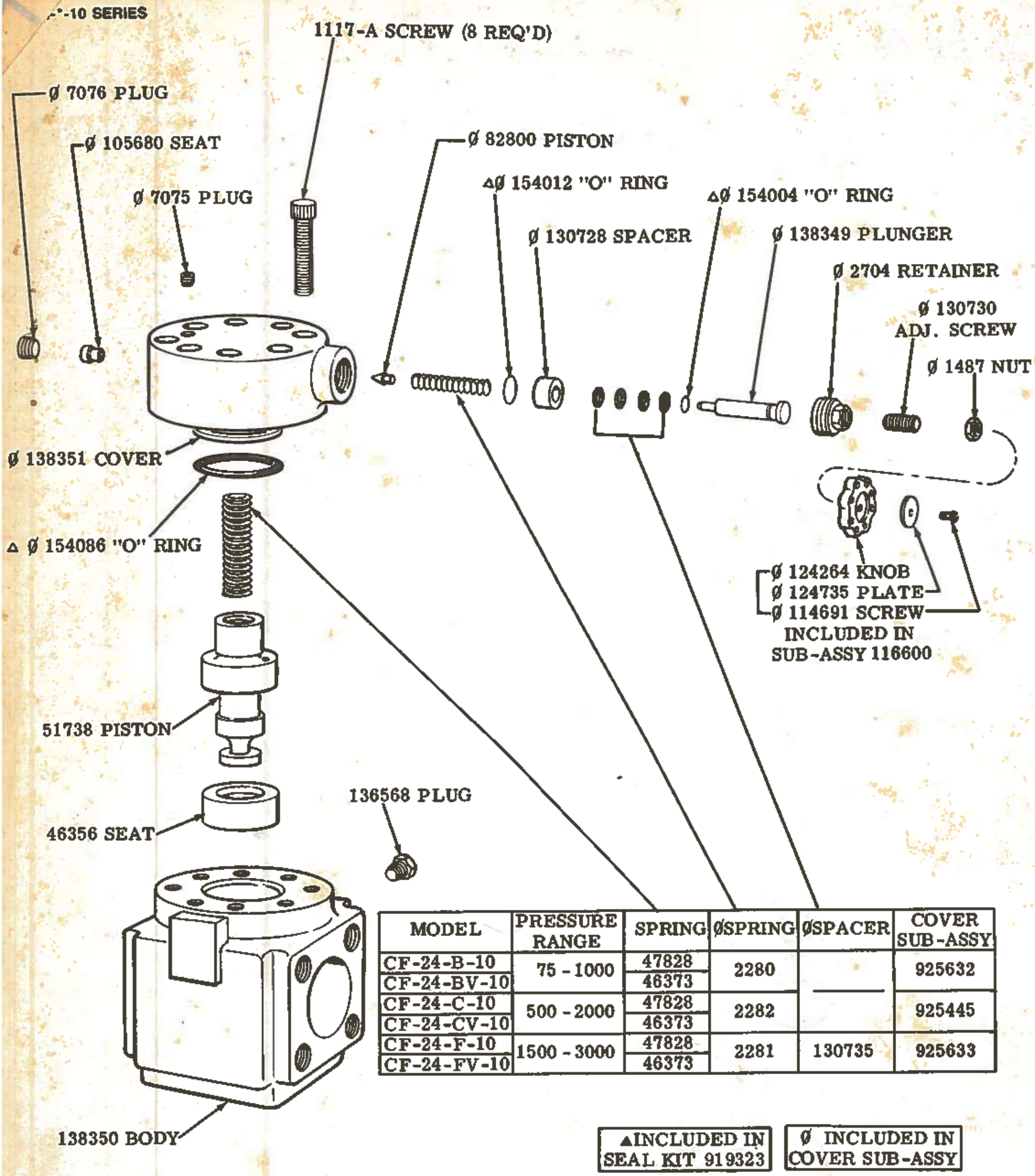
RELIEF VALVE CF-16-H(V)-10

VICKERS
A TRINOVA COMPANY



MODEL	SPRING
CF-16-H-10	28860
CF-16-HV-10	25643

NOTE
FOR INFORMATION ON CONNECTING FLANGES, REFER TO DRAWING I-3962-S.



MODEL	PRESSURE RANGE	SPRING	ØSPRING	ØSPACER	COVER SUB-ASSY
CF-24-B-10	75 - 1000	47828	2280		925632
CF-24-BV-10		46373			
CF-24-C-10	500 - 2000	47828	2282		925445
CF-24-CV-10		46373			
CF-24-F-10	1500 - 3000	47828	2281	130735	925633
CF-24-FV-10		46373			

▲INCLUDED IN SEAL KIT 919323

Ø INCLUDED IN COVER SUB-ASSY

NOTE:
FOR INFORMATION ON CONNECTING FLANGES REFER TO DRAWING I-3962-S

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

VICKERS

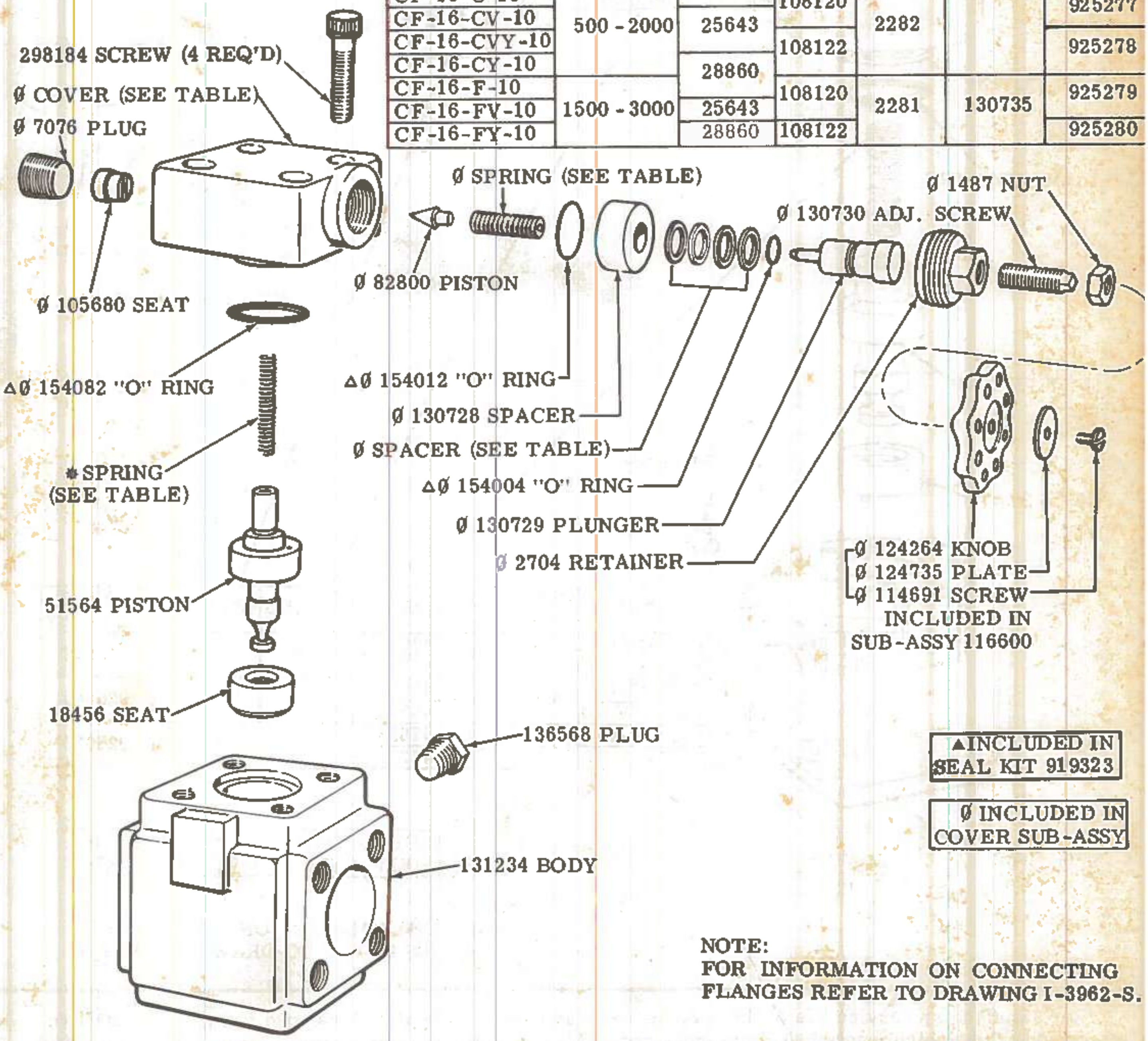
RELIEF
VALVES

Service Parts Information

CF16/24 SERIES

CF-16-*-10 SERIES

MODEL	PRESSURE RANGE	*SPRING	COVER	SPRING	SPACER	COVER SUB-ASSY
CF-16-B-10	75 - 1000	28860	108120	2280		925275
CF-16-BV-10		25643				
CF-16-BY-10		28860	108122			925276
CF-16-C-10	500 - 2000		108120	2282		925277
CF-16-CV-10		25643				
CF-16-CVY-10			108122			925278
CF-16-CY-10		28860				
CF-16-F-10	1500 - 3000		108120	2281	130735	925279
CF-16-FV-10		25643				
CF-16-FY-10		28860	108122			925280



NOTE:
FOR INFORMATION ON CONNECTING FLANGES REFER TO DRAWING I-3962-S.

Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48084

MODEL CODE BREAKDOWN

FM 2 - **- 1 -*** - * - 10 - S*

- FM — FLOW CONTROL & RELIEF VALVE
- 2 — SERIES
- ** — CONNECTION TYPE
  - 00 - STRAIGHT THREAD
  - 04 - PIPE THREAD
- 1 — TYPE CONNECTION 1
- *** — PRESSURE SETTING - PSI
  - 075 - 750 PSI
  - 100 - 1000 PSI
  - 125 - 1250 PSI
  - 150 - 1500 PSI
  - 175 - 1750 PSI
  - 200 - 2000 PSI
- * — CAPACITY
  - 2 GPM
  - 4 GPM
  - 6 GPM
  - 7 GPM
  - 8 GPM
- 10 — DESIGN
- S* — -S1 AND -S2 STRAIGHT THREAD

FM 3 - ** * - *** - *** - 10

- FM — FLOW CONTROL & RELIEF VALVE
- 3 — SERIES
- ** — PORT CONNECTIONS
  - 08 - .500 INCH (NPTF)
  - 12 - .750 INCH (NPTF)
  - 14 - .875 INCH (NPTF)
- * — CONNECTION TYPE
  - S - STRAIGHT THREAD
  - P - PIPE THREADS
- *** — FLOW CONTROL RATE
  - 015 - 1.5 USGPM
  - 020 - 2.0 USGPM
  - 030 - 3.0 USGPM
  - 040 - 4.0 USGPM
  - 050 - 5.0 USGPM
  - 060 - 6.0 USGPM
  - 070 - 7.0 USGPM
  - 080 - 8.0 USGPM
  - 100 - 10.0 USGPM
  - 130 - 13.0 USGPM
  - 150 - 15.0 USGPM
  - 160 - 16.0 USGPM
  - 170 - 17.0 USGPM
  - 200 - 20.0 USGPM
  - 250 - 25.0 USGPM
- *** — RELIEF VALVE SETTING - PSI
  - 050 - 500 PSI
  - 075 - 750 PSI
  - 100 - 1000 PSI
  - 110 - 1100 PSI
  - 125 - 1250 PSI
  - 150 - 1500 PSI
  - 175 - 1750 PSI
  - 200 - 2000 PSI
  - 225 - 2250 PSI
  - 250 - 2500 PSI
  - 300 - 3000 PSI
  - 350 - 3500 PSI
- 10 — DESIGN

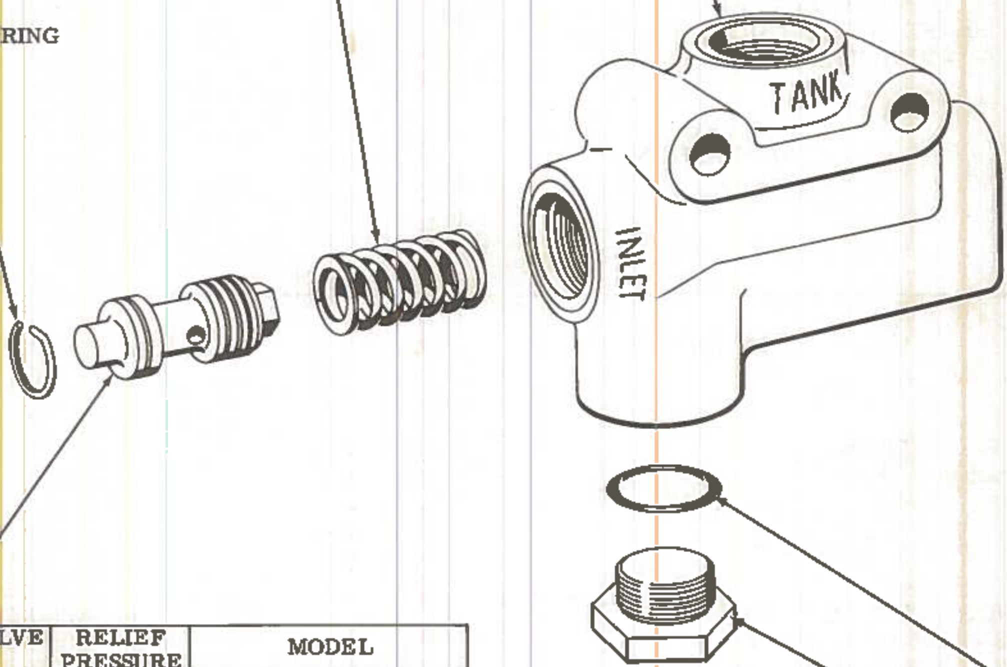
RM3 - ** * - *** - 10

- RM3 — RELIEF VALVE
- ** — PORT CONNECTIONS
  - 08 - .500 INCH
  - 12 - .750 INCH
  - 14 - .875 INCH
- * — CONNECTION TYPE
  - S - STRAIGHT THREAD
  - P - PIPE THREAD
- *** — RELIEF VALVE SETTING - PSI
  - 015 - 150 PSI
  - 050 - 500 PSI
  - 075 - 750 PSI
  - 100 - 1000 PSI
  - 125 - 1250 PSI
  - 150 - 1500 PSI
  - 175 - 1750 PSI
  - 200 - 2000 PSI
  - 225 - 2250 PSI
  - 250 - 2500 PSI
  - 275 - 2750 PSI
- 10 — DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

Litho in U.S.A.

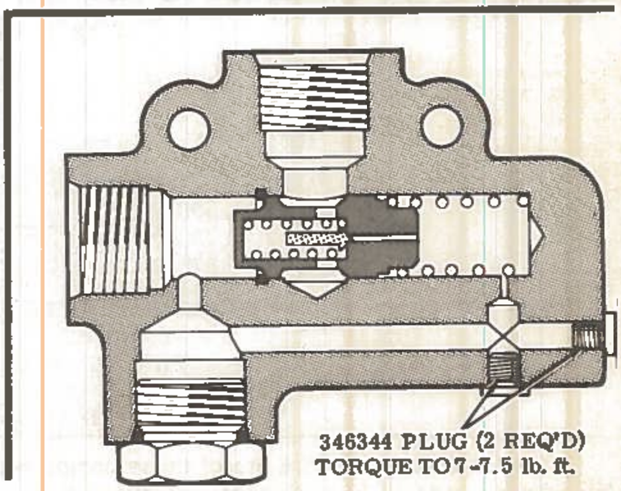
BODY NOT SOLD SEPARATELY.
ORDER BY COMPLETE
MODEL NUMBER



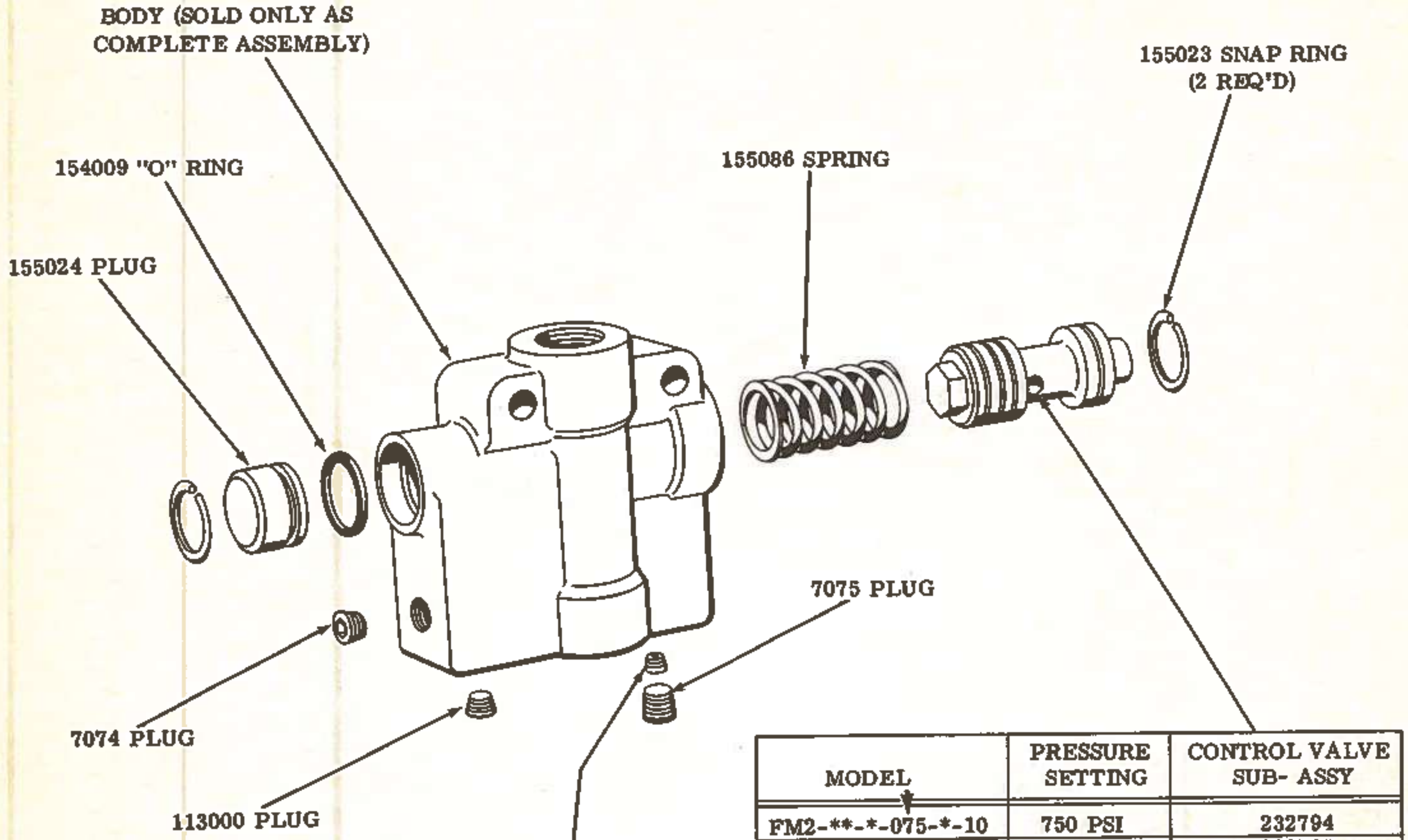
CONTROL VALVE SUB-ASSY	RELIEF PRESSURE	MODEL
284219	150 PSI	RM3-***-015-10
233018	500 PSI	FM3 & RM3-***-050-10
232794	750 PSI	FM3 & RM3-***-075-10
232795	1000 PSI	FM3 & RM3-***-100-10
265620	1100 PSI	FM3-***-***-110-10
232796	1250 PSI	FM3 & RM3-***-125-10
232797	1500 PSI	FM3 & RM3-***-150-10
232798	1750 PSI	FM3 & RM3-***-175-10
232799	2000 PSI	FM3 & RM3-***-200-10
233019	2250 PSI	FM3 & RM3-***-225-10
233020	2500 PSI	FM3 & RM3-***-250-10
266200	2750 PSI	RM3-***-275-10
■ 266054	3000 PSI	FM3-***-***-300-10
■ 277557	3500 PSI	FM3-***-***-350-10

MODEL	PLUG	"O" RING
RM3-12S-***-10	186580	154129
RM3-14S-***-10	181792	154130
RM3-08P-***-10	7077	——

■CAUTION
MODELS WITH CRACKING PRESSURES 3000 PSI AND ABOVE REQUIRE -005 MODEL SUFFIX FEATURE. (NPT 7074 PLUG IN PLACE OF 1650 BALL)

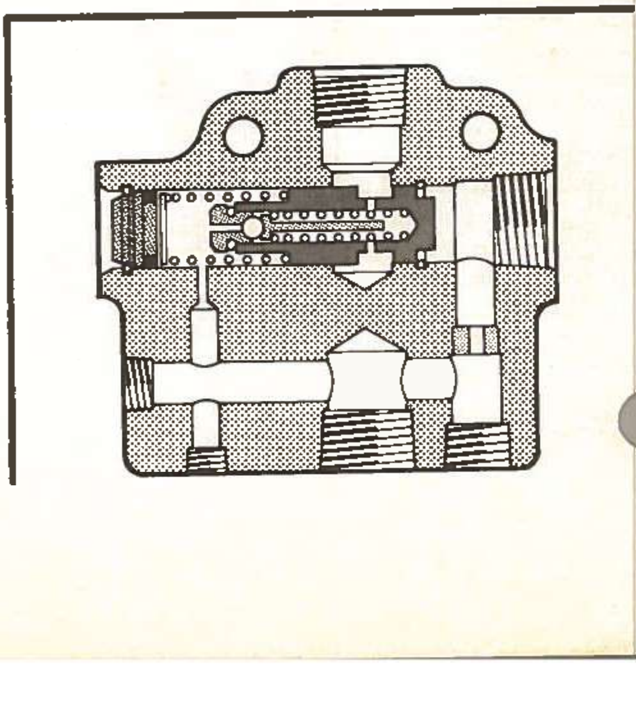


M2-0*-1-*-*-10-S*



MODEL	PRESSURE SETTING	CONTROL VALVE SUB- ASSY
FM2-**-*-075-*-10	750 PSI	232794
FM2-**-*-100-*-10	1000 PSI	232795
FM2-**-*-125-*-10	1250 PSI	232796
FM2-**-*-150-*-10	1500 PSI	232797
FM2-**-*-175-*-10	1750 PSI	232798
FM2-**-*-200-*-10	2000 PSI	232799

MODEL	CAPACITY (GPM)	RESTRICTION PLUG
FM2-**-*-*-2-10	2	167463
FM2-**-*-*-4-10	4	167464
FM2-**-*-*-6-10	6	167465
FM2-**-*-*-7-10	7	165359
FM2-**-*-*-8-10	8	167466



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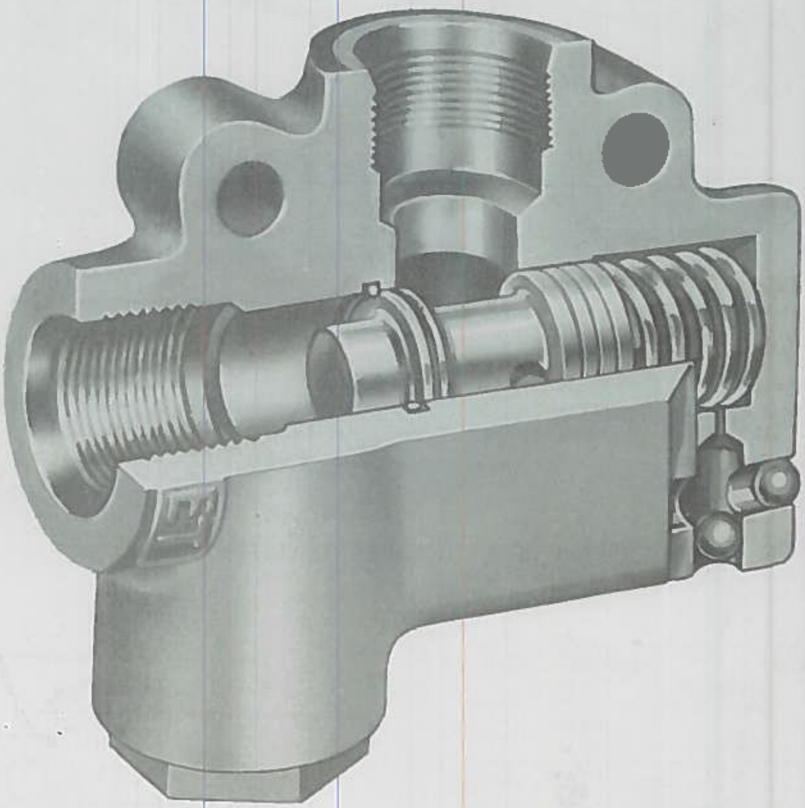
Service Parts Information

Flow Control & Relief Valves

FM2, FM3 and RM3



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 12-1-87 **M-2551-S**

SEAL KIT NOTE

design valves are manufactured as shown with F3 ed internally. Interface seals are standard Nitrile l and are converted to F3 in the seal kit. All seals eal kit are F3.

OL PART	DIAGRAM PLATE "A" LH	"A" RH	"C" STD/S87/S163	"N"
213231	577490	290348	—	577486
213232	—	—	290345 577480	—

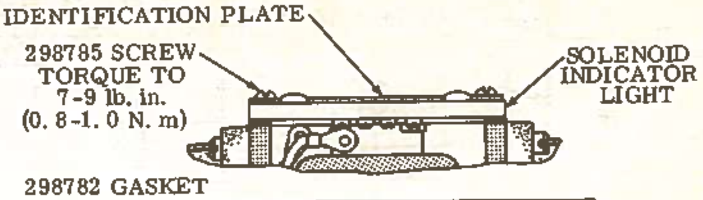
NOTE

OL DESIGNATION OF (68B) INDICATES VALVE EMBLED "LH" & IS USED AS A PILOT FOR TWO E VALVES WITH "4" OR "8" TYPE MAIN STAGE LS.

NOTE

SINGLE SOLENOID MODELS RIGHT HAND AS- BLY SHOWN. FOR LEFT HAND ASSEMBLY ALL 'S ARE REVERSED, EXCEPT BODY & SPOOL. LH MODEL: DG4S4-01**-*-5*-LH

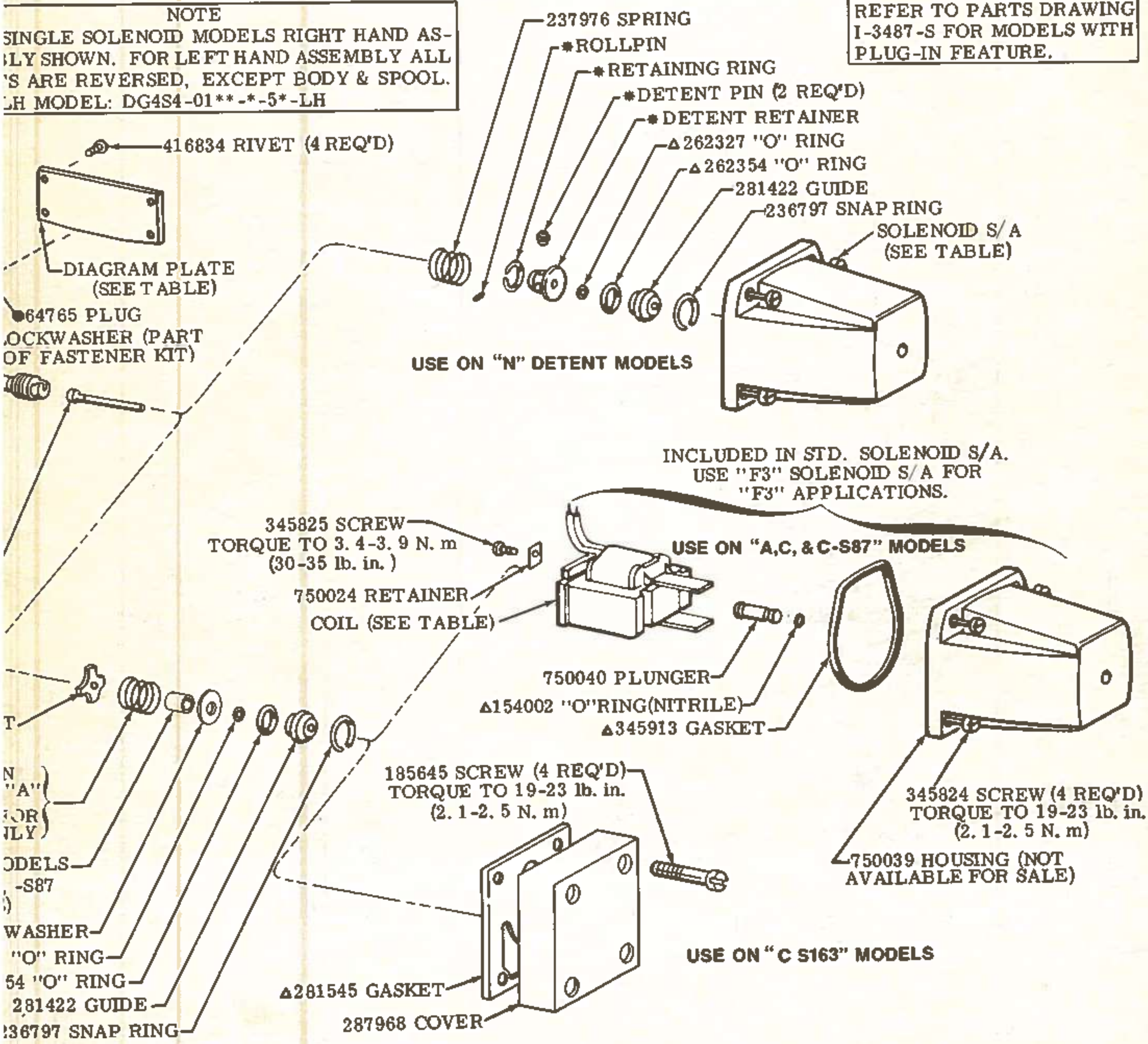
FOR MODELS WITH SOLENOID INDICATOR LIGHTS



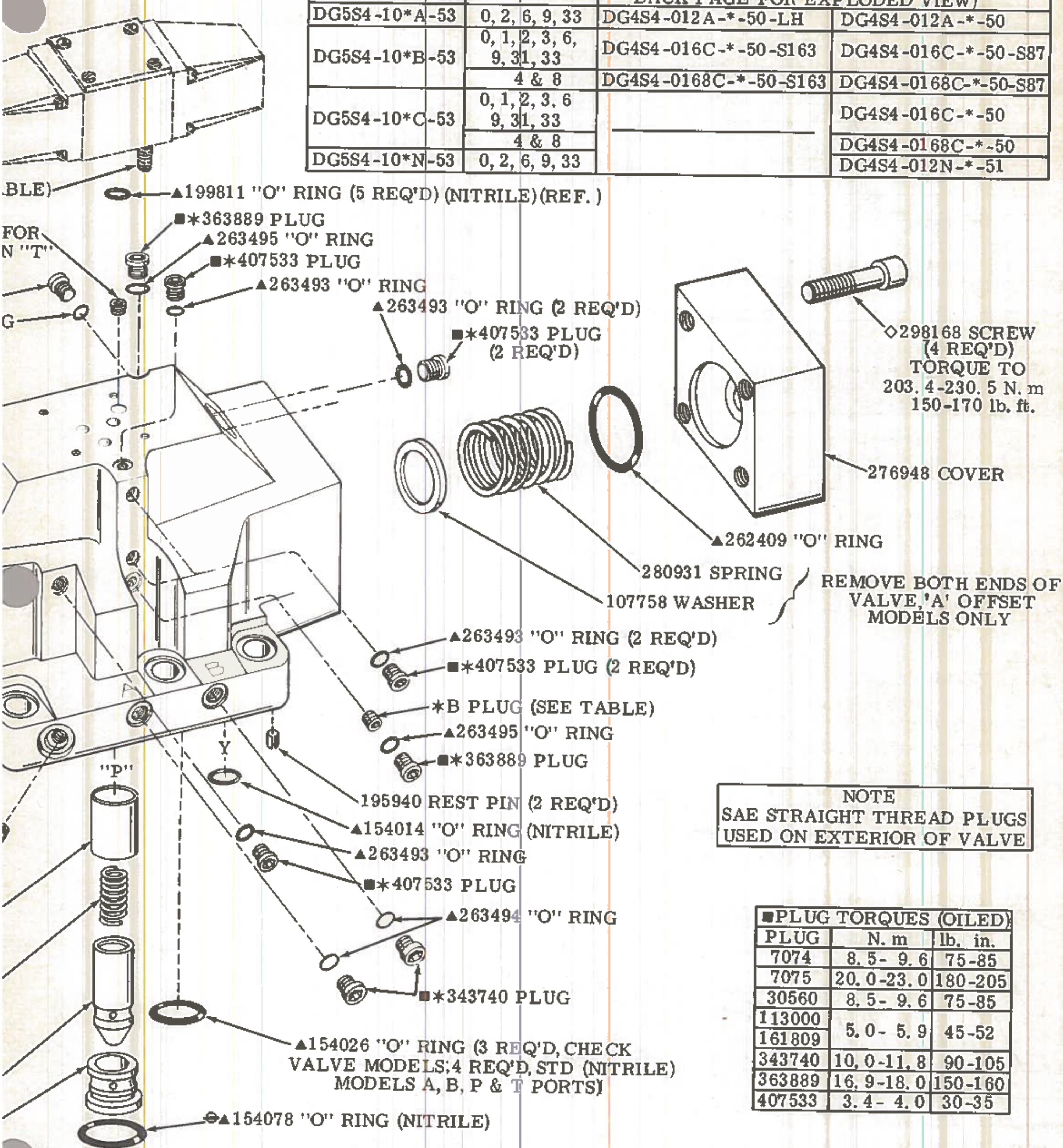
SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617

NOTE

REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURE.



VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	VALVE IS ASSEMBLED: LEFT HAND	VALVE IS ASSEMBLED: RIGHT HAND (STD)
		PILOT VALVE MODEL CODE (SEE BACK PAGE FOR EXPLODED VIEW)	
DG5S4-10*A-53	0, 2, 6, 9, 33	DG4S4-012A-*-50-LH	DG4S4-012A-*-50
DG5S4-10*B-53	0, 1, 2, 3, 6, 9, 31, 33	DG4S4-016C-*-50-S163	DG4S4-016C-*-50-S87
	4 & 8	DG4S4-0168C-*-50-S163	DG4S4-0168C-*-50-S87
DG5S4-10*C-53	0, 1, 2, 3, 6 9, 31, 33		DG4S4-016C-*-50
	4 & 8		DG4S4-0168C-*-50
DG5S4-10*N-53	0, 2, 6, 9, 33		DG4S4-012N-*-51

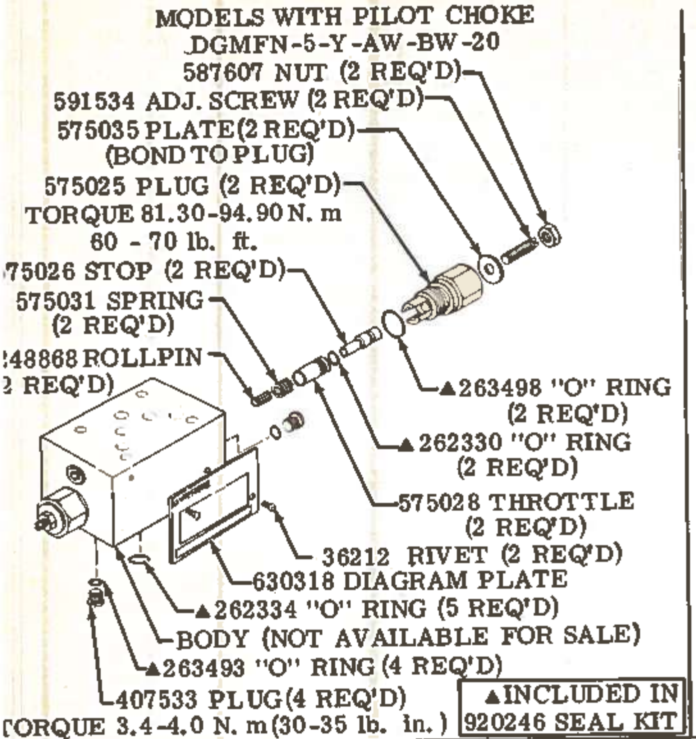


NOTE
SAE STRAIGHT THREAD PLUGS USED ON EXTERIOR OF VALVE

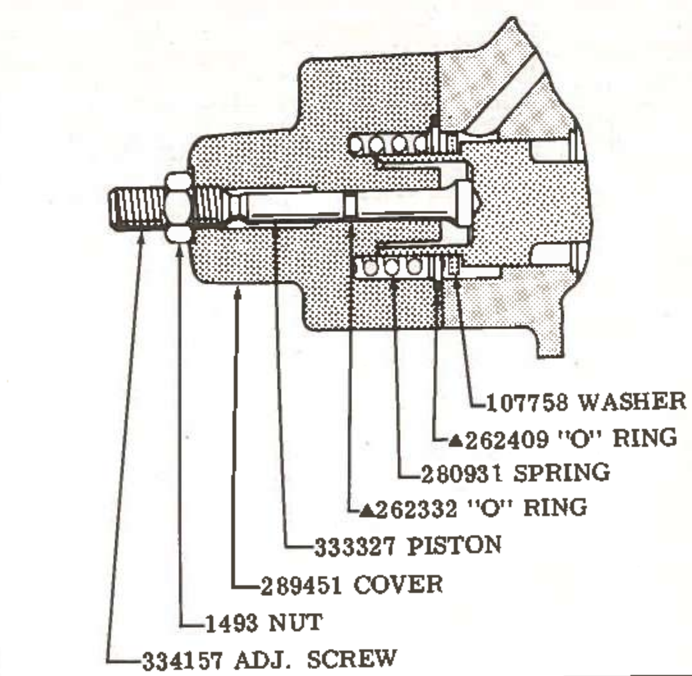
■PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
7074	8.5- 9.6	75-85
7075	20.0-23.0	180-205
30560	8.5- 9.6	75-85
113000 161809	5.0- 5.9	45-52
343740	10.0-11.8	90-105
363889	16.9-18.0	150-160
407533	3.4- 4.0	30-35

SEAL KIT NOTE

The -53 design valves are manufactured as shown with F3 seals used internally. Interface seals are standard Nitrile material and are converted to F3 in the seal kit. All seals in the seal kit are F3.



STROKE ADJUSTMENT PARTS



MODEL CODE BREAKDOWN

(F3)-(P) DG5S4(L)-10**(X)(*)-(E)-(T)-(*)-(***AC**)-53-LH**

- (F3) — MULTI-FLUID CAPABILITY (VITON SEALS)
- (P**) — ELECTRICAL PLUG FEATURE (SEE NOTE BELOW)
- D — DIRECTIONAL VALVE
- G — SUBPLATE OR MANIFOLD MOUNTED
- 5 — SOLENOID CONTROLLED PILOT OPERATED
- S — SLIDING SPOOL
- 4 — FLOW DIRECTIONS: 4 - 4 WAY
- (L) — L - SOLENOID INDICATOR LIGHTS; OMITTED - NONE
- 10 — 1.25 INCH SERIES 100
- * — TYPE OF MAIN STAGE SPOOL
- * — VALVE TYPE
  - A - SPRING OFFSET
  - B - SPRING CENTERED (ONE SOLENOID)
  - C - SPRING CENTERED
  - N - NO SPRING DETENTED
- (X) — "X" - FAST RESPONSE MODEL; OMITTED - LOW SHOCK MODEL
- (*) — SPOOL CONTROL MODIFICATIONS (OMIT IF NOT REQUIRED)
  - 1-STROKE ADJUSTMENTS
  - 2-PILOT CHOKE ADJS.
  - 3-PILOT CHOKE & STROKE ADJ
  - 7-STROKE ADJ "A" END ONLY
  - 8-STROKE ADJ "B" END ONLY
- (E) — E-EXTERNAL PILOT PRESSURE; OMITTED - INTERNAL PILOT PRESSURE
- (T) — T - INTERNAL PILOT DRAIN; OMITTED - EXTERNAL PILOT DRAIN
- (*) — CHECK VALVE
  - OMITTED - NO CHECK VALVE
  - K - 5 PSI (0.35 bar)
  - L - 35 PSI (2.4 bar)
  - R - 50 PSI (3.45 bar)
  - S - 75 PSI (5.2 bar)
- (***AC**) — VOLTAGE & FREQUENCY; OMITTED - 115AC60 STD.
- 53 — DESIGN
- LH — LEFT HAND ASSEMBLY

ELECTRICAL PLUG FEATURE (OMIT IF NOT REQUIRED)

PA - INSTA-PLUG, MALE RECEPTACLE ONLY PB - INSTA-PLUG, MALE & FEMALE RECEPTACLE	PA3 (3 PIN) & PA5 (5 PIN) RECEPTACLES THAT MEET NFPA HYDRAULIC VALVE ELECTRICAL STANDARD T3. 5. 29M-1980.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

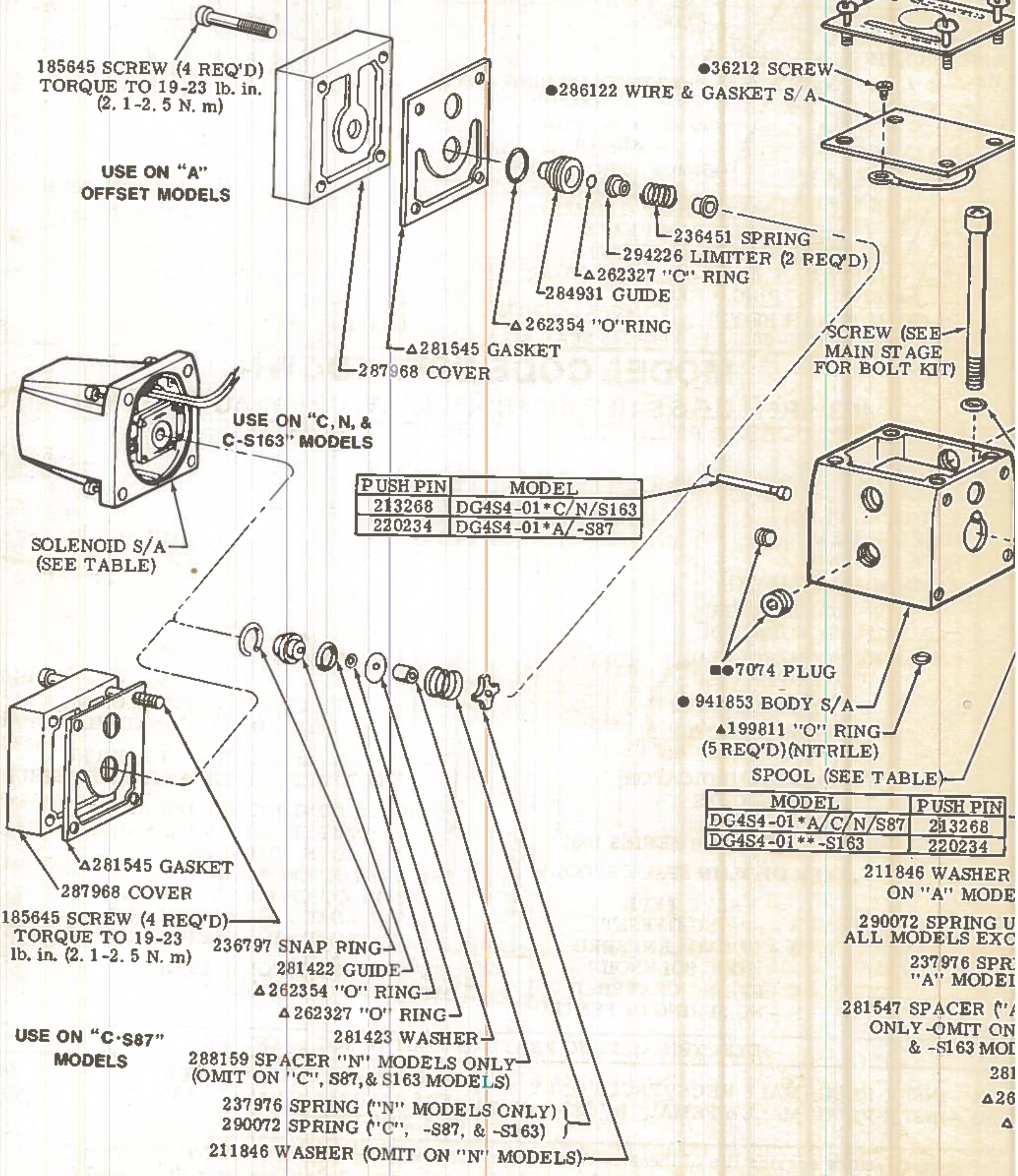
Litho in U. S. A.

● INCLUDED IN 941853 BODY S/A

✱ INCLUDED IN 942132 DETENT KIT

△ INCLUDED IN F3 PILOT VALVE SEAL KIT 919214

VOLTAGE	SOLENOID S/A			
	S/A COMPLETE		COIL	
	STD	F3	STD	F3
115AC60	281291	317767	316011	317768
230AC60	281292	317769	298721	317770
460AC60	281293	317771	298722	317772
FOR ADDITIONAL SOLENOID S/A'S SEE I-3544-S				



PUSH PIN	MODEL
213268	DG4S4-01*C/N/S163
220234	DG4S4-01*A/-S87

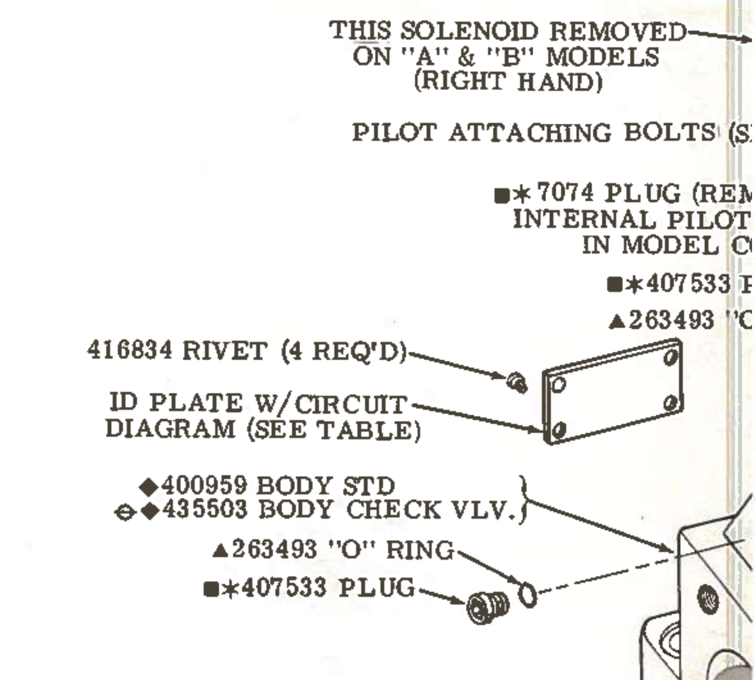
MODEL	PUSH PIN
DG4S4-01*A/C/N/S87	213268
DG4S4-01**-S163	220234

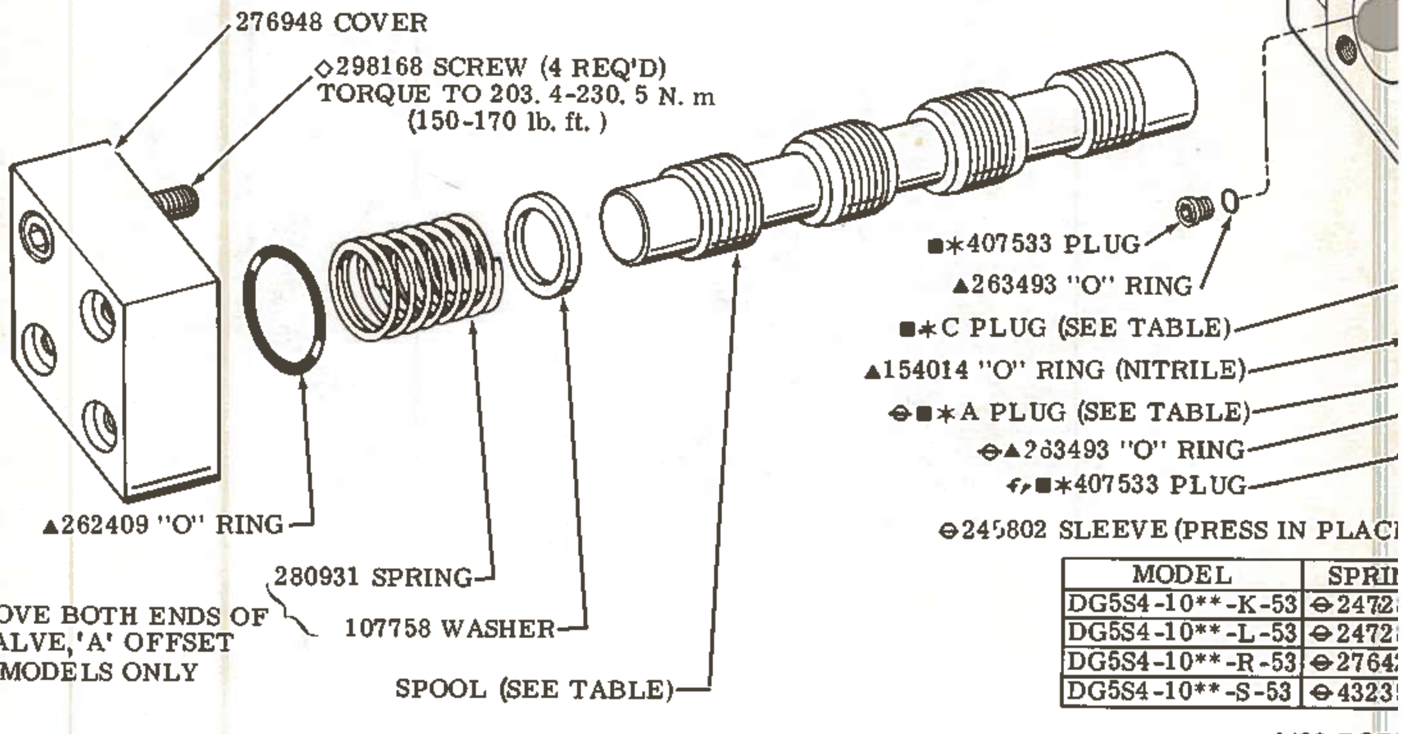
VALVE MODEL CODE			I. D. PLATE W/ CIRCUIT DIAGRAM	
MAIN STAGE SPOOL	VALVE TYPE	SPOOL	A ONLY	B, C, N
DG5S4-100-	A/B/C/N	364037	400975	400976
DG5S4-101-	B/C	*331404	———	400977
DG5S4-102-	A/B/C/N	364038	400975	400978
DG5S4-103-	B/C	*277479	———	400979
DG5S4-104-	B/C	281193	———	400980
DG5S4-106-	A/B/C/N	364039	400975	400981
DG5S4-108-	B/C	364041	———	400980
DG5S4-109-	A/B/C/N	277563	400975	400976
DG5S4-1031-	B/C	*277479	———	580475
DG5S4-1033-	A/B/C/N	364042	400975	400981

*ASSEMBLE TYPE 1 & 3 SPOOLS WITH NARROW CENTER LAND TOWARD 'A' END OF VALVE. 'A' END OF VALVE IS DEFINED AS BEING CLOSEST TO CYLINDER PORT 'A'. THE TYPE 31 SPOOL IS INSTALLED IN REVERSE OF TYPE '3'. WITH NARROW CENTER LAND TOWARD 'B' END OF VALVE.

PILOT ATTACHING PARTS		
MODEL	BOLT (4 REQ'D)	L'WASHER (4 REQ'D)
W/OUT PILOT CHOKE	◻ 1034	⌀◻68907
W/ PILOT CHOKE (SEE BACK PAGE)	⌀ 10938	⌀◻68907
TORQUE TO 100-112 lb. in. (11. 3-12. 7 N. m)		

PLUG INSTALLATION TABLE			
MODEL	PLUG "A"	PLUG "B"	PLUG "C"
DG5S4-10**-53	DOES NOT EXIST	30560	OUT
DG5S4-10**-E-53	DOES NOT EXIST	7074	30560
DG5S4-10**-X-53	DOES NOT EXIST	OUT	OUT
DG5S4-10**-X-E-53	DOES NOT EXIST	7074	OUT
DG5S4-10**-K/L/R/S-53	161809	7074	OUT
DG5S4-10**-E-K/L/R/S-53	113000	7074	30560
DG5S3-10**-X-K/L/R/S-53	OUT	7074	OUT
DG5S4-10**-X-E-K/L/R/S-53	113000	7074	OUT





MODEL	SPRI
DG5S4-10**-K-53	⊖2472
DG5S4-10**-L-53	⊖2472
DG5S4-10**-R-53	⊖2764
DG5S4-10**-S-53	⊖4323

⊖6422 POP

⊖289102

△▲ INCLUDED IN F3 SEAL KIT 920213
◇ INCLUDED IN FASTENER KIT 941262
◻ INCLUDED IN BOLT KIT 255633
⌀ INCLUDED IN BOLT KIT 255654
✱ INCLUDED IN PLUG KIT 941263
■ PLUG TORQUES (SEE TABLE)
◆ NOT AVAILABLE FOR SALE
⊖ USED ON CHECK VALVE MODELS ONLY

NOTE
PARTS INCLUDED IN SERVICE KITS NOT SOLD SEPARATELY

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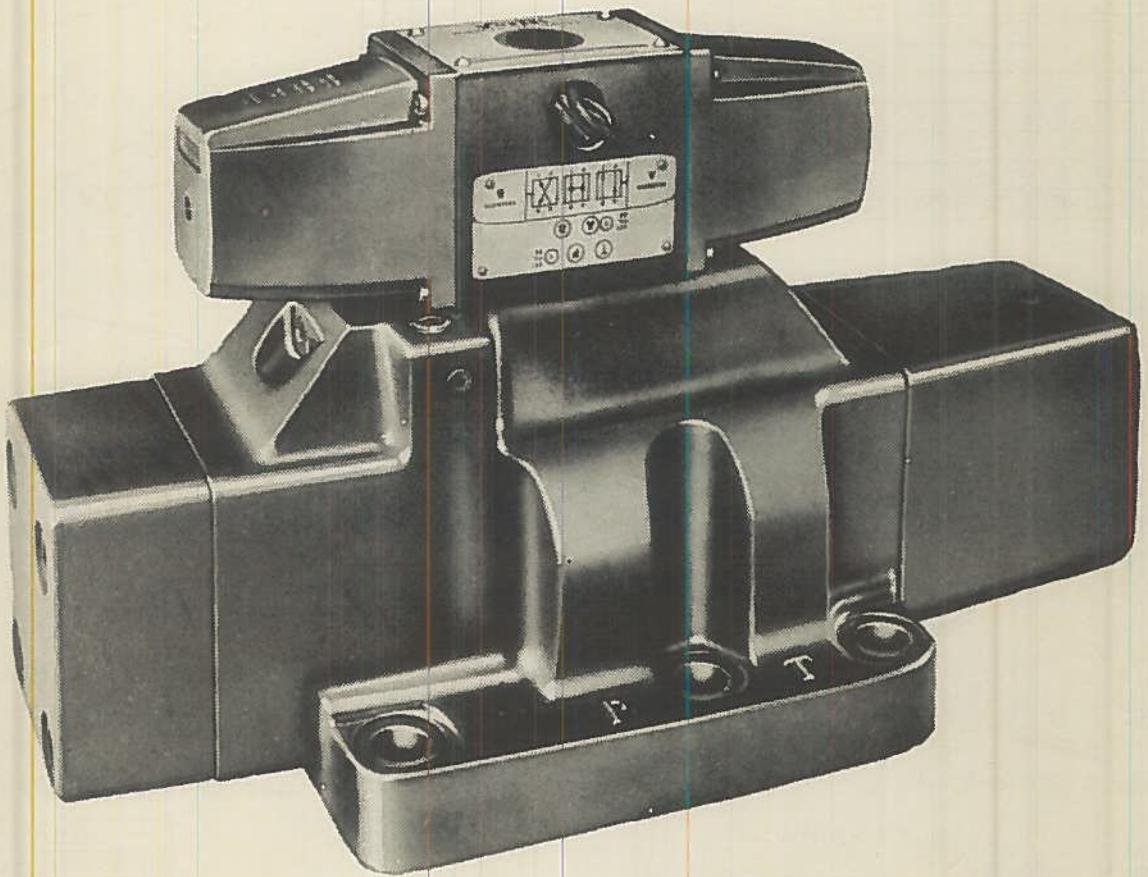
Service Parts Information

Air Gap Solenoid Controlled Pilot Operated Directional Control Valves

DG5S4-10*A-*-*-53
DG5S4-10*B-*-*-53
DG5S4-10*C-*-*-53
DG5S4-10*N-*-*-53



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 9-1-86

I-3624-S

116

MODEL CODE BREAKDOWN

D*8P1--**-1***

- DIRECTIONAL CONTROL
- MOUNTING CONNECTION
  - S - STR. THREADED
  - T - PIPE THREADED
- VALVE TYPE
  - 8 - IN LINE
- SPOOL ACTION
  - P - POPPET
- FLOW DIRECTION
  - 1 - ONE WAY FLOW
- VALVE SIZE SERIES
  - 02 - 1/4 INCH
  - 03 - 3/8 INCH
  - 06 - 3/4 INCH
  - 10 - 1¼ INCH
- CRACKING PRESSURE
  - 5 - 5 PSI
  - 15 - 15 PSI
  - 20 - 20 PSI
  - 30 - 30 PSI
  - 35 - 35 PSI
  - 40 - 40 PSI
  - 50 - 50 PSI
  - 65 - 65 PSI
  - 95 - 95 PSI
- DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

INLINE CHECK VALVE

DT8P1-10/-11
DS8P1-10/-11

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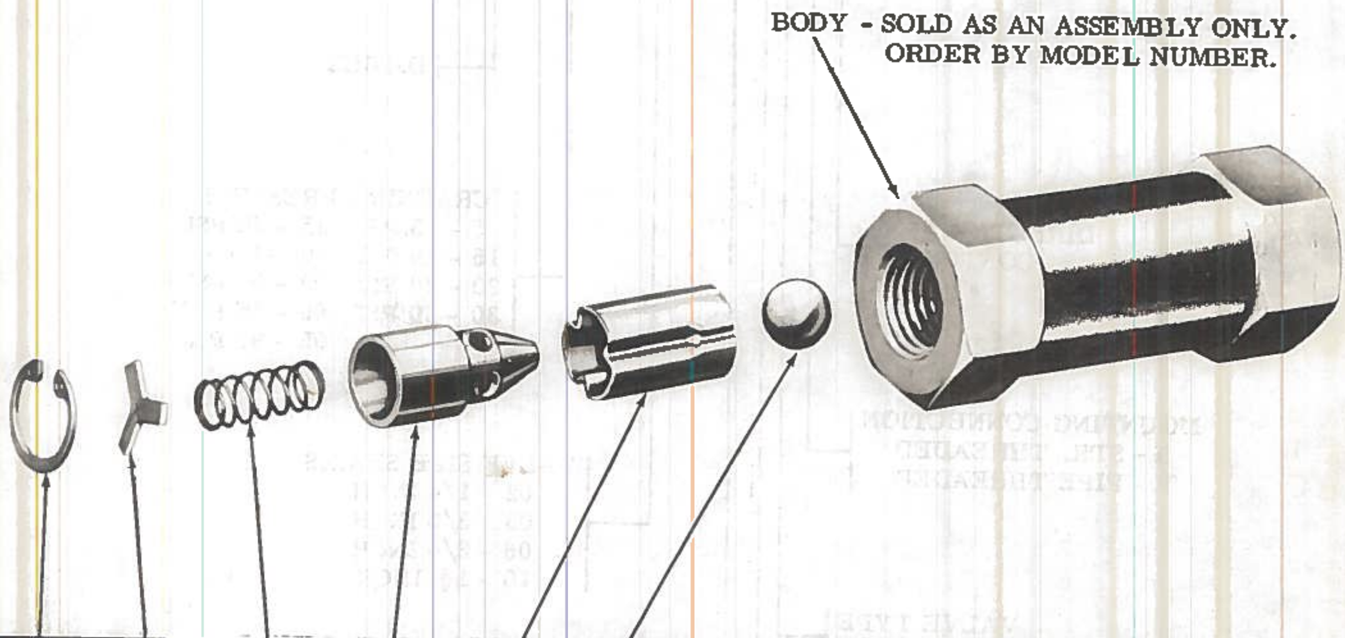
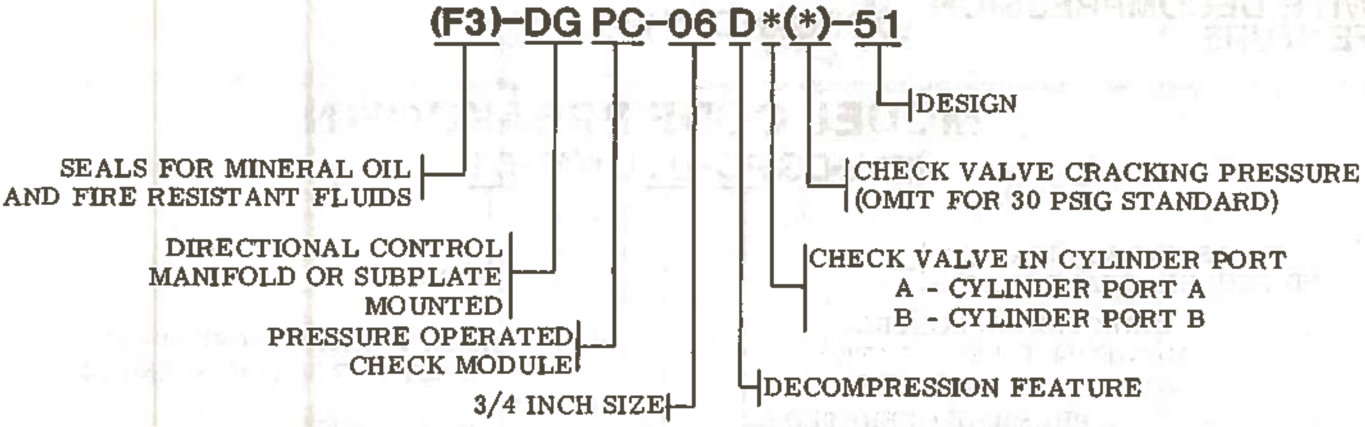
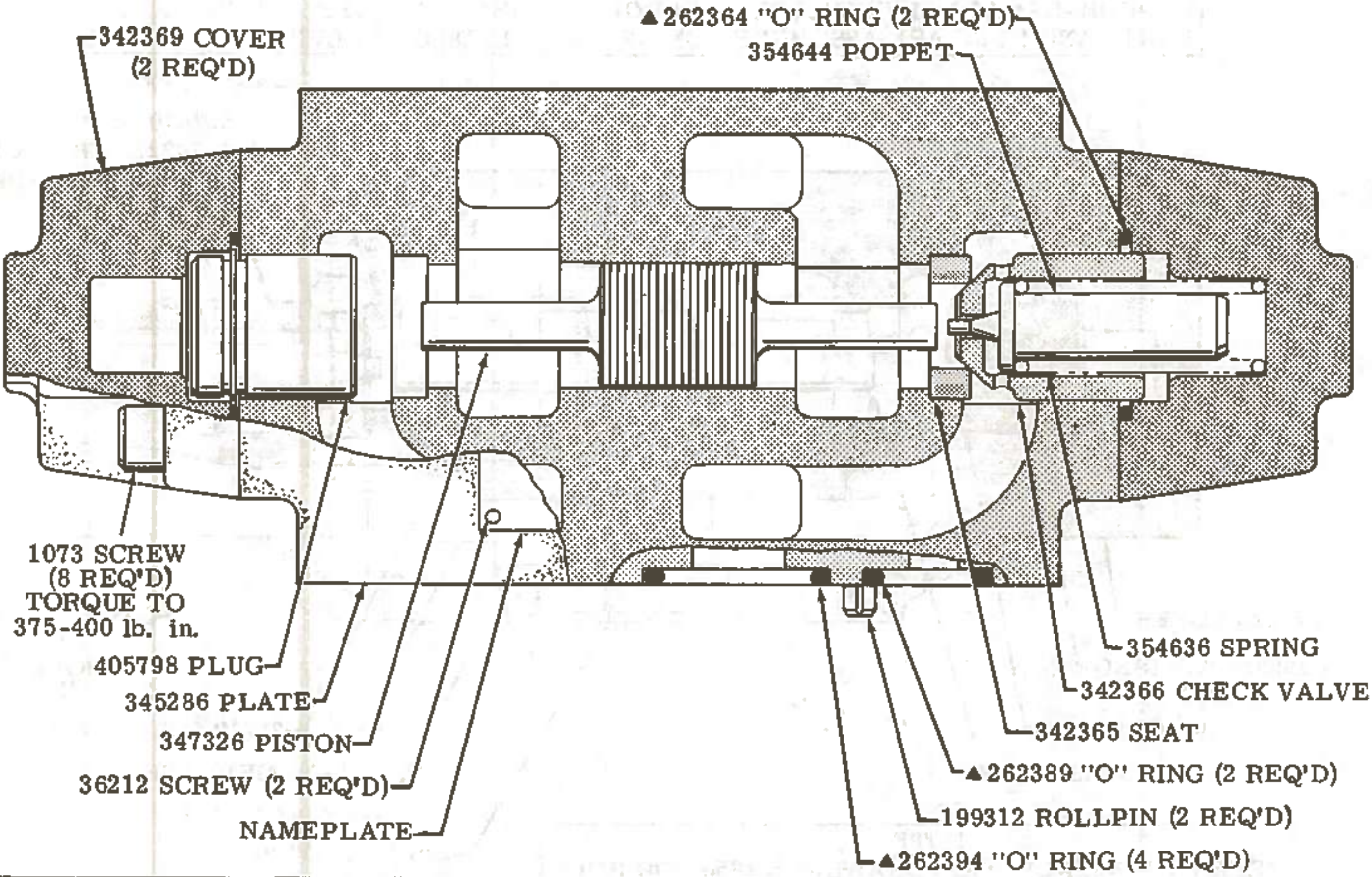


RET. RING	WASHER	SPRING	POPPET	SLEEVE	BALL	PIPE SIZE	CRACKING PRESSURE P.S.I.	MODEL
92733	113714	113559	——	113715	1651	1/4	5	DT8P1-02-5-10
		216999					30	DT8P1-02-30-10
		114094					65	DT8P1-02-65-10
106642	123740	123761	123737	——	——	3/8	5	D*8P1-03-5-10
		217000					30	DT8P1-03-30-10
		123760					65	D*8P1-03-65-10
98702	125673	125779	125674	——	——	3/4	5	D*8P1-06-5-11
		222541					15	D*8P1-06-15-11
		418556					20	DT8P1-06-20-11
		216998					30	D*8P1-06-30-11
		425262					40	DT8P1-06-40-11
		580963					50	DT8P1-06-50-11
		125780					65	D*8P1-06-65-11
113752	125635	125631	125634	——	——	1-$\frac{1}{4}$	5	D*8P1-10-5-11
		312094					15	DT8P1-10-15-11
		216548					30	DT8P1-10-30-11
		257354					50	DT8P1-10-50-11
		125632					65	D*8P1-10-65-11
		582338					95	DT8P1-10-95-11

MODEL CODE BREAKDOWN



NOTE
DGPC-06-DA*-51 VALVE SHOWN. FOR DGPC-06-DB*-51 VALVES, CHECK VALVE PARTS AND PLUG ARE ASSEMBLED ON OPPOSITE ENDS OF VALVE.



NOTE
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 700 lb. in.

▲SERVICE UNITS WITH F3 SEAL KIT 920216

Service Parts Information

PRESSURE OPERATED CHECK VALVE MODULE WITH DECOMPRESSION FEATURE

DGPC-06D*(*)-51

DGPC-01D*(*)-51

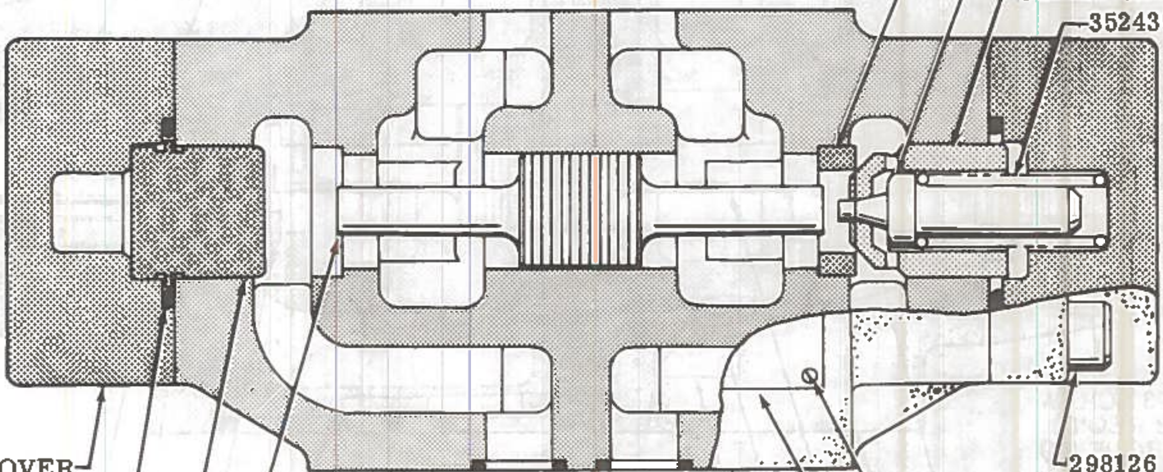
VICKERS®
A TRINOVA COMPANY

MODEL CODE BREAKDOWN

(F3)–DGPC–01D*(*)–51

- (F3) – SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- DG – DIRECTIONAL CONTROL MANIFOLD OR SUBPLATE MOUNTED
- PC – PRESSURE OPERATED CHECK MODULE
- 01 – 1/8 INCH SIZE
- D – DECOMPRESSION FEATURE
- * – CHECK VALVE IN CYLINDER PORT
  - A - CYLINDER PORT A
  - B - CYLINDER PORT B
- (*) – CHECK VALVE CRACKING PRESSURE (OMIT FOR 30 PSIG STANDARD)
- 51 – DESIGN

NOTE
DGPC-01-DA*-51 VALVE SHOWN. FOR DGPC-01-DB*-51 VALVES, CHECK VALVE PARTS AND PLUG ARE ASSEMBLED ON OPPOSITE ENDS OF VALVE.



NOTE
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 112 lb. in.

▲SERVICE UNITS WITH F3 SEAL KIT 920215

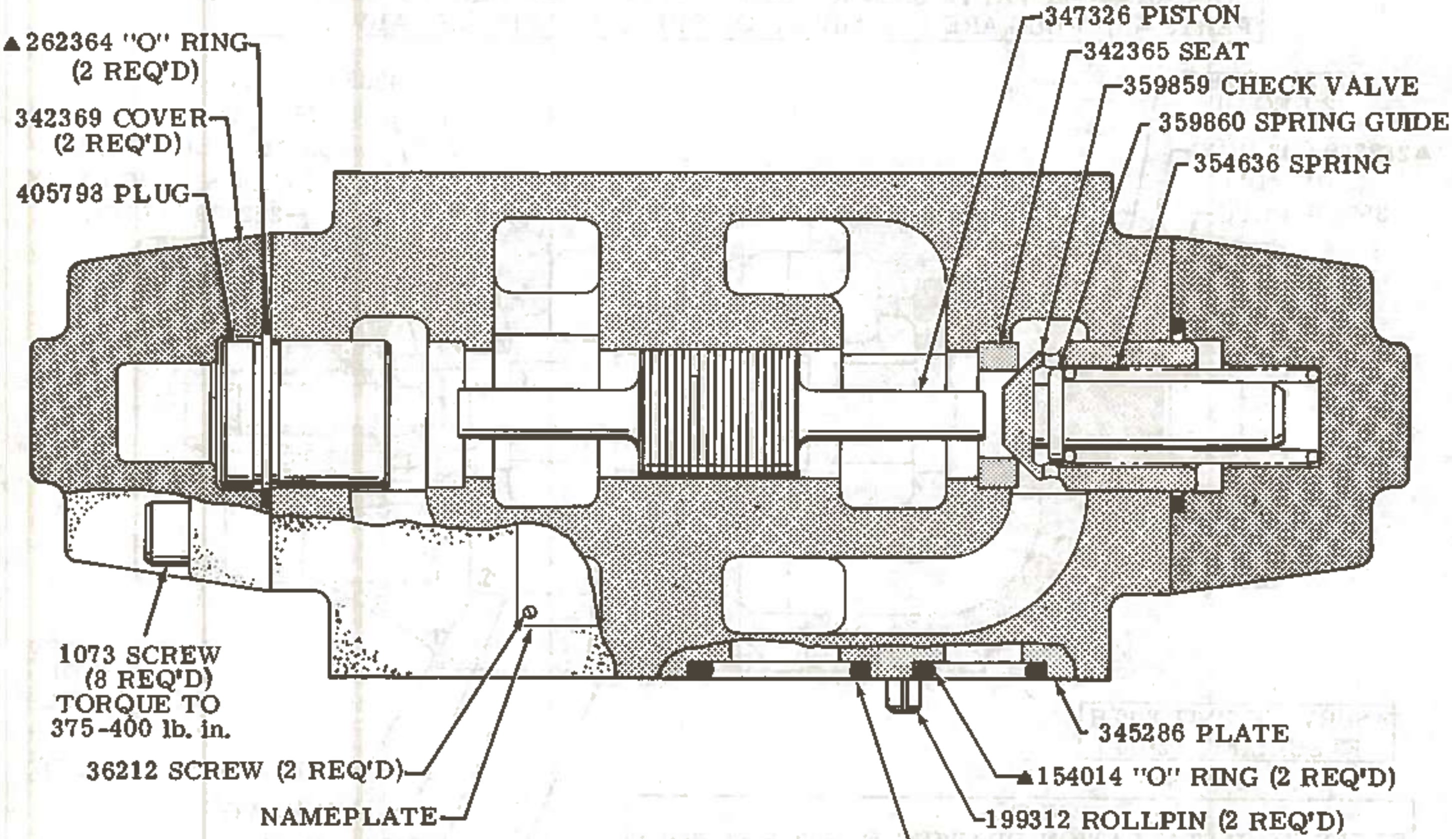
Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

DG PC-06--51**

- DG — DIRECTIONAL CONTROL MANIFOLD OR SUBPLATE MOUNTED
- PC — PRESSURE OPERATED CHECK MODULE
- 06 — 3/4 INCH SIZE
- First * — CHECK VALVE IN CYLINDER PORT
  - A - CYLINDER PORT A
  - B - CYLINDER PORT A
- Second * — CHECK VALVE CRACKING PRESSURE (OMIT FOR 30 PSIG STANDARD)
- 51 — DESIGN

NOTE
DGPC-06-A*-51 VALVE SHOWN. FOR DGPC-06-B*-51 VALVES, CHECK VALVE PARTS AND PLUG ARE ASSEMBLED ON OPPOSITE ENDS OF VALVE.



NOTE
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 700 lb. in.

▲SERVICE UNIT WITH F3 SEAL KIT 920216

Litho in U. S. A.

Service Parts Information

PRESSURE OPERATED CHECK VALVES

DGPC-06-**-51

DGPC-01-**-51

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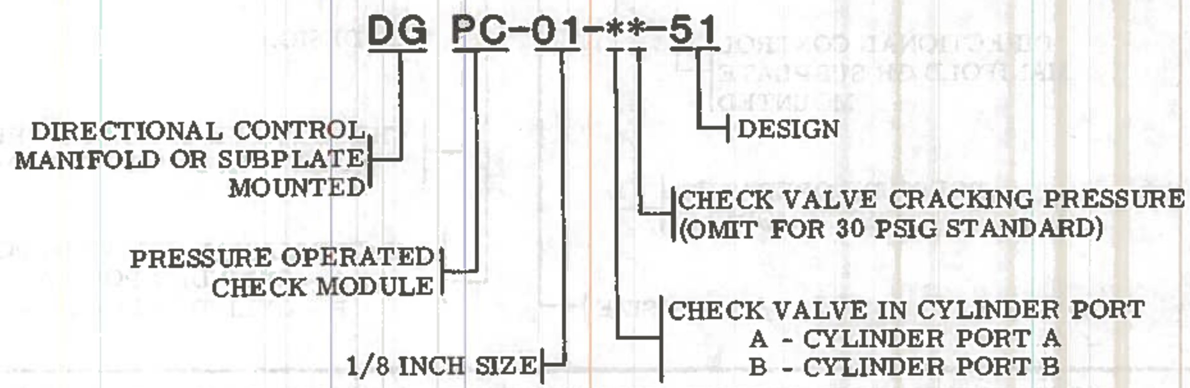
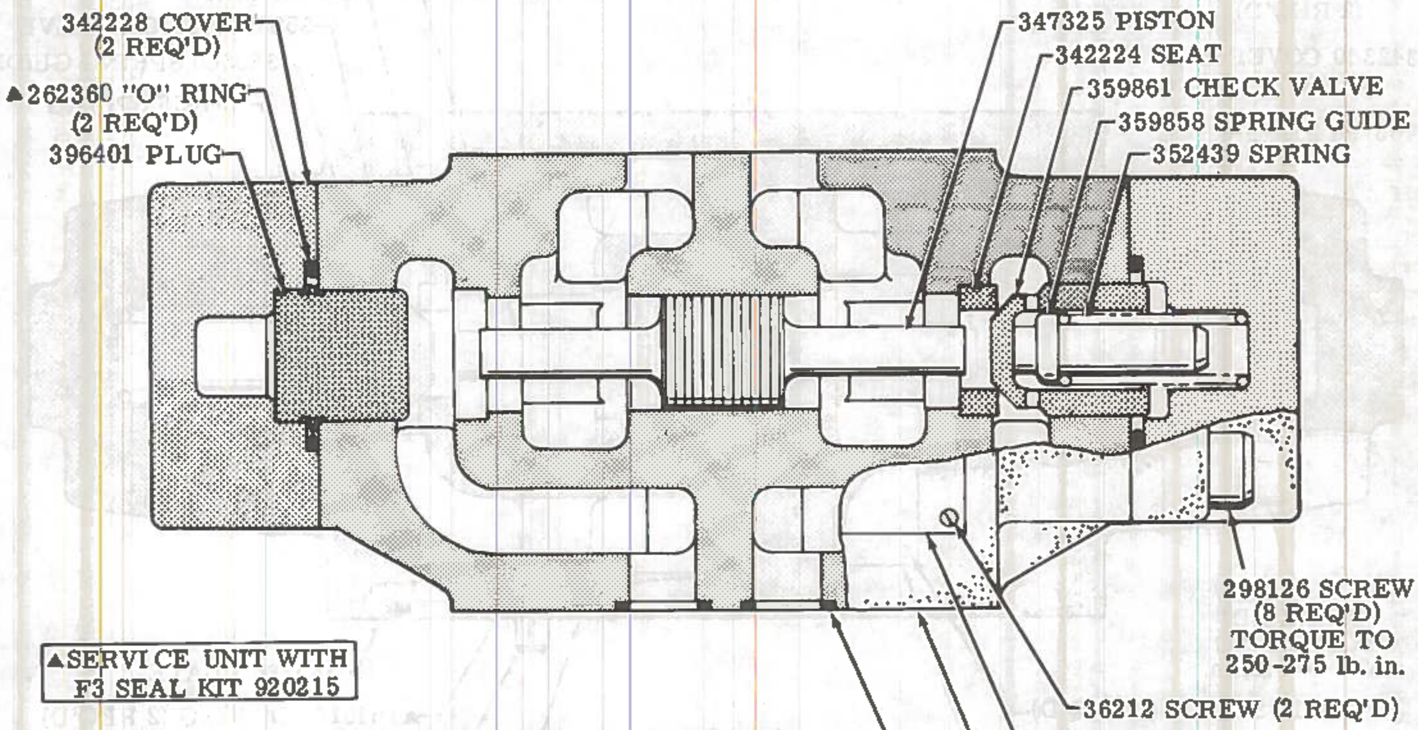
MODEL CODE BREAKDOWN



NOTE
DGPC-01-A*-51 VALVE SHOWN. FOR DGPC-01-B*-51 VALVES, CHECK VALVE PARTS AND PLUG ARE ASSEMBLED ON OPPOSITE ENDS OF VALVE.

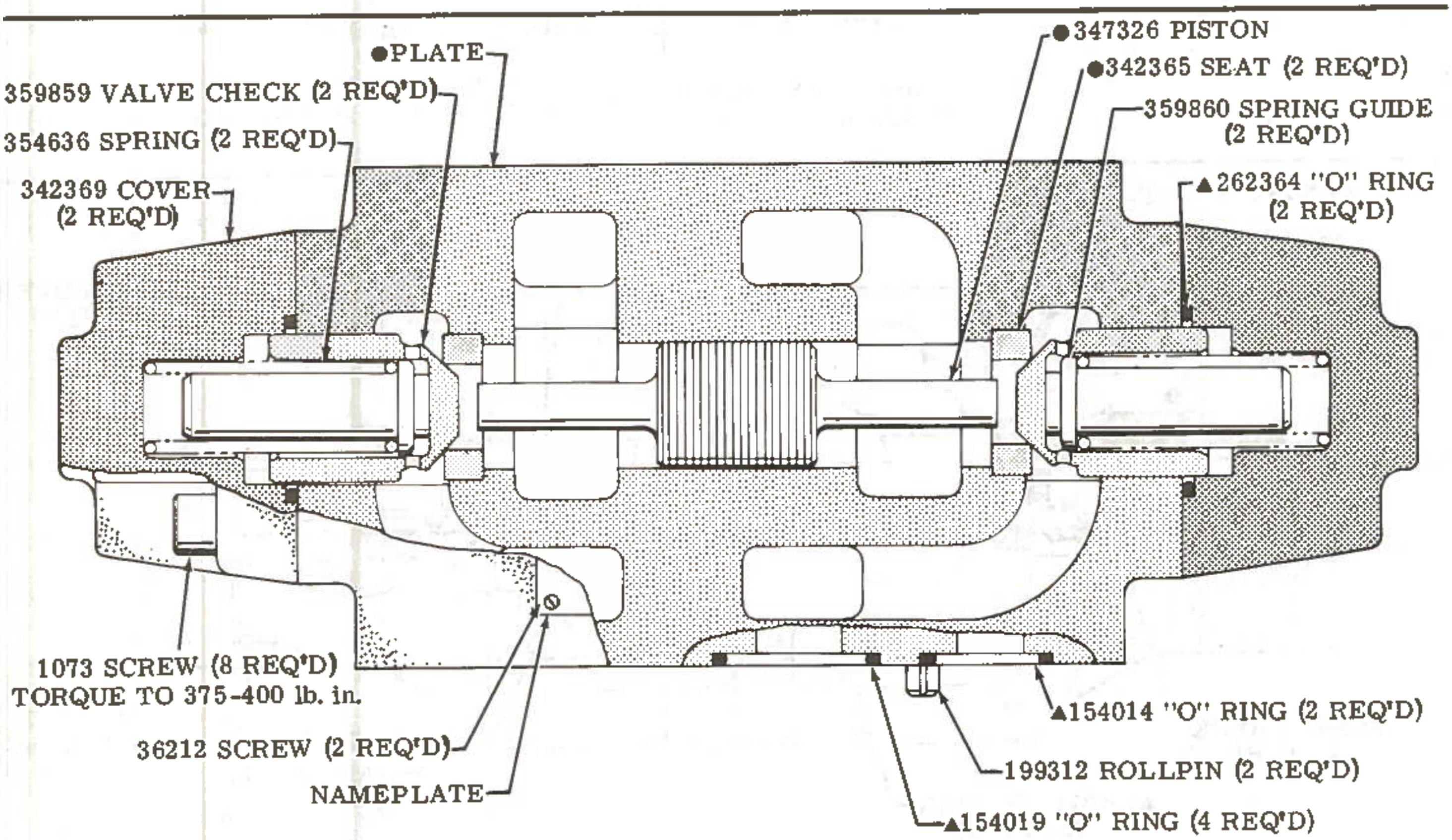


NOTE
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 112 lb. in.

MODEL CODE BREAKDOWN

DG PC-06-A*B*-51

- DG — DIRECTIONAL CONTROL MANIFOLD OR SUBPLATE MOUNTED
- PC — PRESSURE OPERATED CHECK MODULE
- 06 — 3/4 INCH SIZE
- A — CHECK VALVE IN CYL. A PORT
- * — CYL. A PORT CHECK VALVE CRACKING PRESSURE (OMIT FOR 30 PSIG STANDARD)
- B — CHECK VALVE IN CYL. B PORT
- * — CYL. B PORT CHECK VALVE CRACKING PRESSURE (OMIT FOR 30 PSIG STANDARD)
- 51 — DESIGN



CAUTION
THIS VALVE CANNOT BE USED WITH PRESSURE CENTERED OR DG-18 AIR OPERATED VALVES.

NOTE
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 700 lb. in. SUBPLATE INFORMATION IS TABULATED ON PARTS DRAWING I-3381-S.

▲INCLUDED IN F3 SEAL KIT 920216

●INCLUDED IN 349164 BODY S/A

Litho in U. S. A.

Service Parts Information

VICKERS
A TRINOVA COMPANY

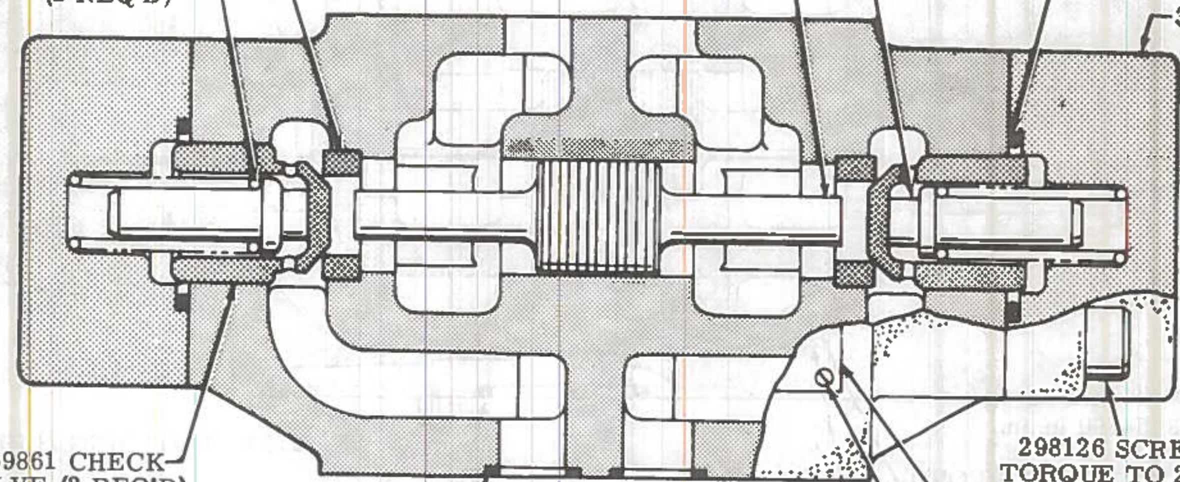
PRESSURE OPERATED CHECK VALVES

DGPC-01-A*B*-51
DGPC-06-A*B*-51

MODEL CODE BREAKDOWN

DG PC-01-A* B*-51

- DG — DIRECTIONAL CONTROL MANIFOLD OR SUBPLATE MOUNTED
- PC — PRESSURE OPERATED CHECK MODULE
- 01 — 1/8 INCH SIZE
- A — CHECK VALVE IN CYLINDER A PORT
- * — CYL. A PORT CHECK VALVE CRACKING PRESSURE (OMIT FOR 30 PSIG STANDARD)
- B — CHECK VALVE IN CYL. B PORT
- * — CYL. B PORT CHECK VALVE CRACKING PRESSURE (OMIT FOR 30 PSIG STANDARD)
- 51 — DESIGN



CAUTION
THIS VALVE CANNOT BE USED WITH PRESSURE CENTERED OR DG-18 AIR OPERATED VALVES.

NOTE
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 112 lb. in. SUBPLATE INFORMATION IS TABULATED ON PARTS DRAWING I-3381-S.

●INCLUDED IN 347456 BODY S/A

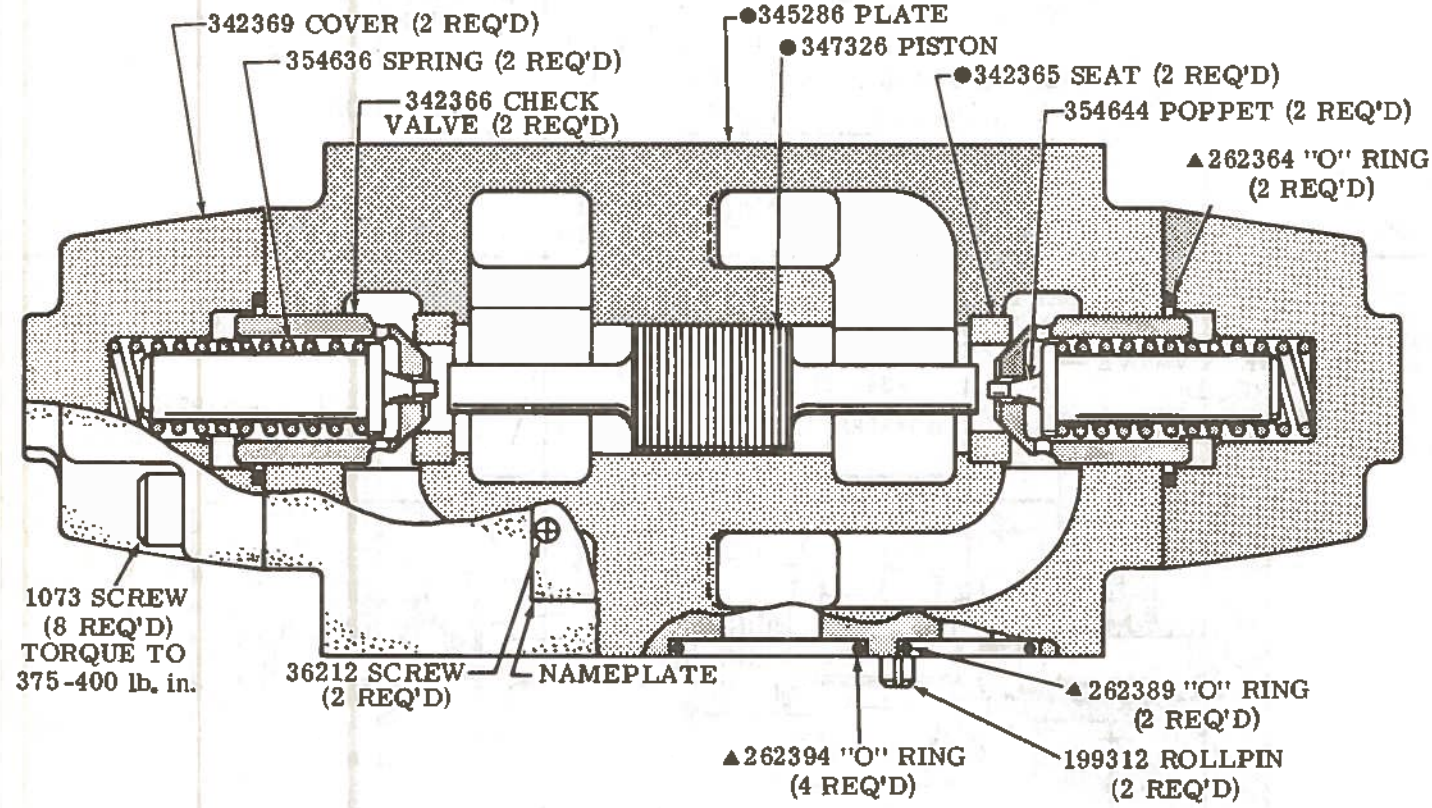
▲INCLUDED IN F3 SEAL KIT 920215

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

(F3)-DG PC-06-DA*DB*-51

- (F3) — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- DG — DIRECTIONAL CONTROL GASKET MOUNTED
- PC — PRESSURE OPERATED CHECK MODULE
- 06 — 3/4 INCH SIZE
- D — DECOMPRESSION FEATURE
- A — CHECK VALVE IN CYL. PORT A
- * — CHECK VALVE CRACKING PRESSURE CYL. PORT A STANDARD 30 PSI (OMIT FOR STANDARD)
- D — DECOMPRESSION FEATURE
- B — CHECK VALVE IN CYL. PORT B
- * — CHECK VALVE CRACKING PRESSURE CYL. PORT B STANDARD 30 PSI (OMIT FOR STANDARD)
- 51 — DESIGN



NOTE
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 700 lb. in.

▲SERVICE UNITS WITH F3 SEAL KIT 920216

●INCLUDED IN 349164 SUBASSY

Service Parts Information

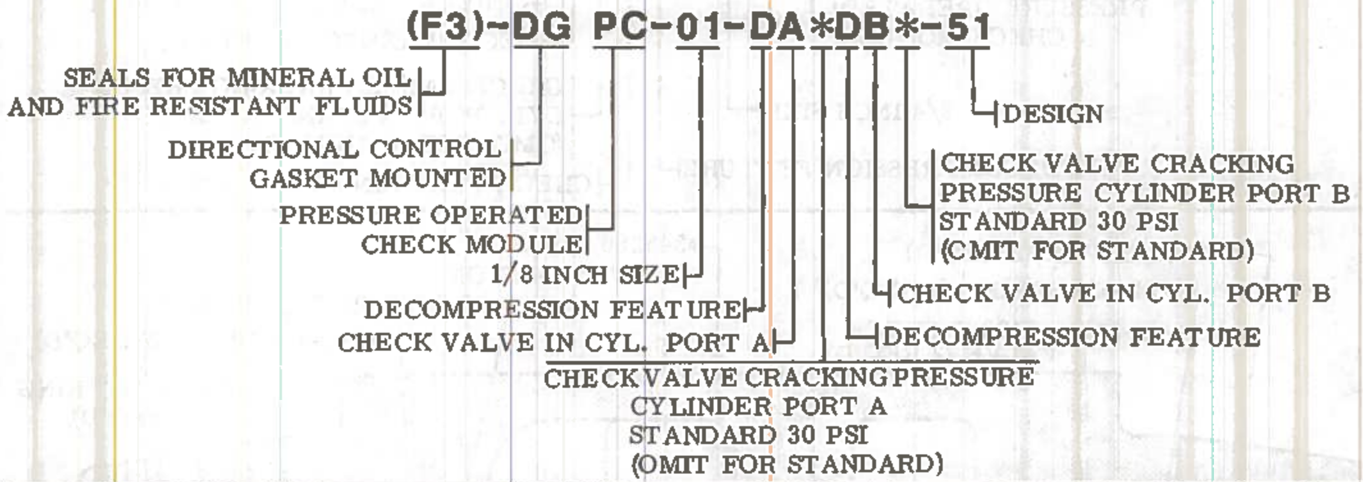
PRESSURE OPERATED CHECK VALVE MODULE WITH DECOMPRESSION FEATURE

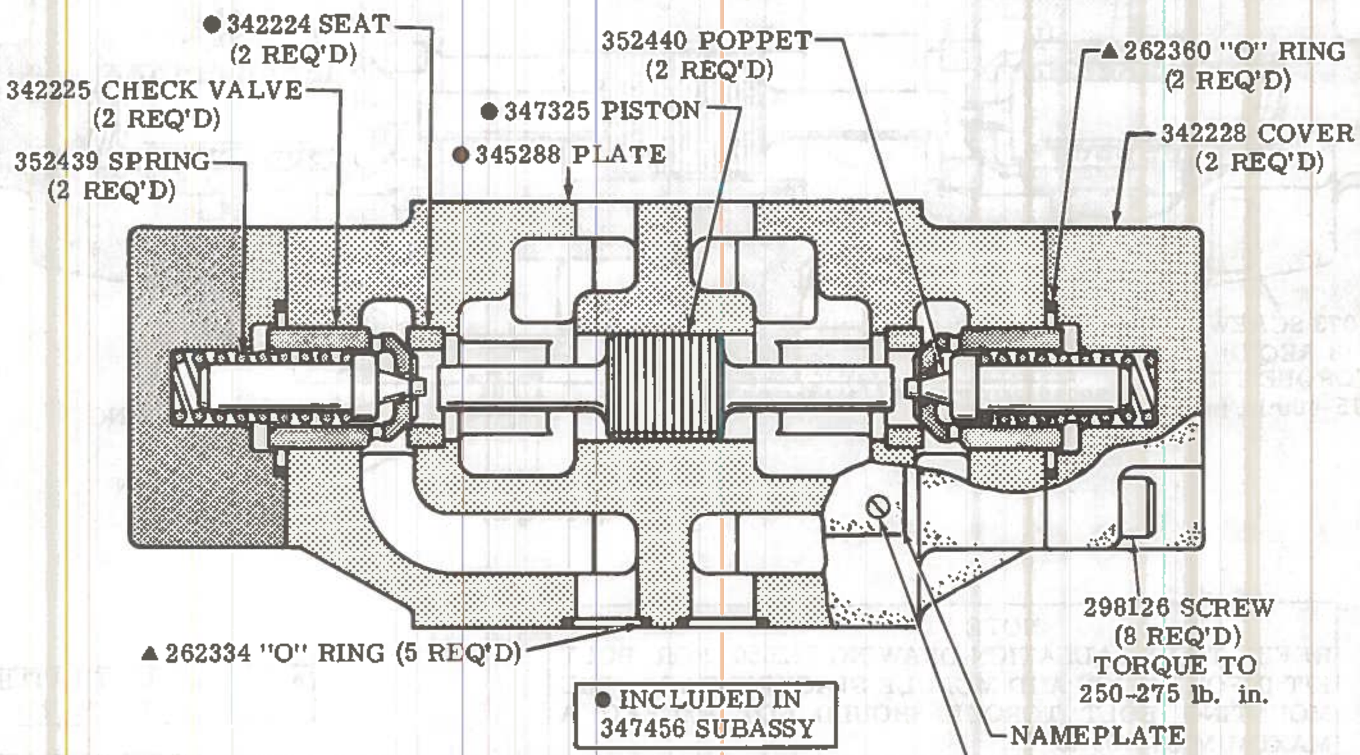
DGPC-06-DA*DB*-51

DGPC-01-DA*DB*-51

VICKERS®
A TRINOVA COMPANY

MODEL CODE BREAKDOWN





NOTE
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 112 lb. in.

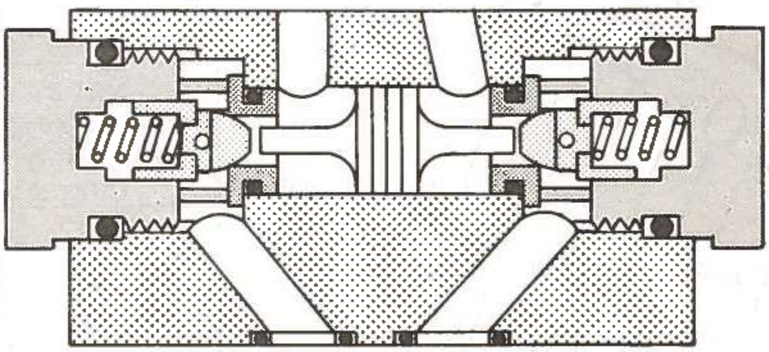
▲ SERVICE UNITS WITH F3 SEAL KIT 920215

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

DGM PC-3-*-(***)-20**

- **DGM** — DIRECTIONAL CONTROL MODULE SUBPLATE MOUNTED
- **PC** — TYPE OF MODULE
PC - PILOT OPERATED CHECK
- **3** — NFPA-D01 INTERFACE ISO-4401-3
- **1st *** — PORT OPERATED UPON
A OR B PORT
- **2nd *** — PILOT PORT
A OR B PORT
- **3rd *** — CRACKING PRESSURE
K = 1 BAR (14. 5 PSI)
- **(1st *)** — PORT OPERATED UPON
B PORT
- **(2nd *)** — PILOT PORT
A PORT
- **(3rd *)** — CRACKING PRESSURE
K = 1 BAR (14. 5 PSI)
- **20** — DESIGN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

VICKERS
A TRINOVA COMPANY

PILOT OPERATED CHECK VALVE MODULES

DGMPC-3-* * * *-(* * *)-20

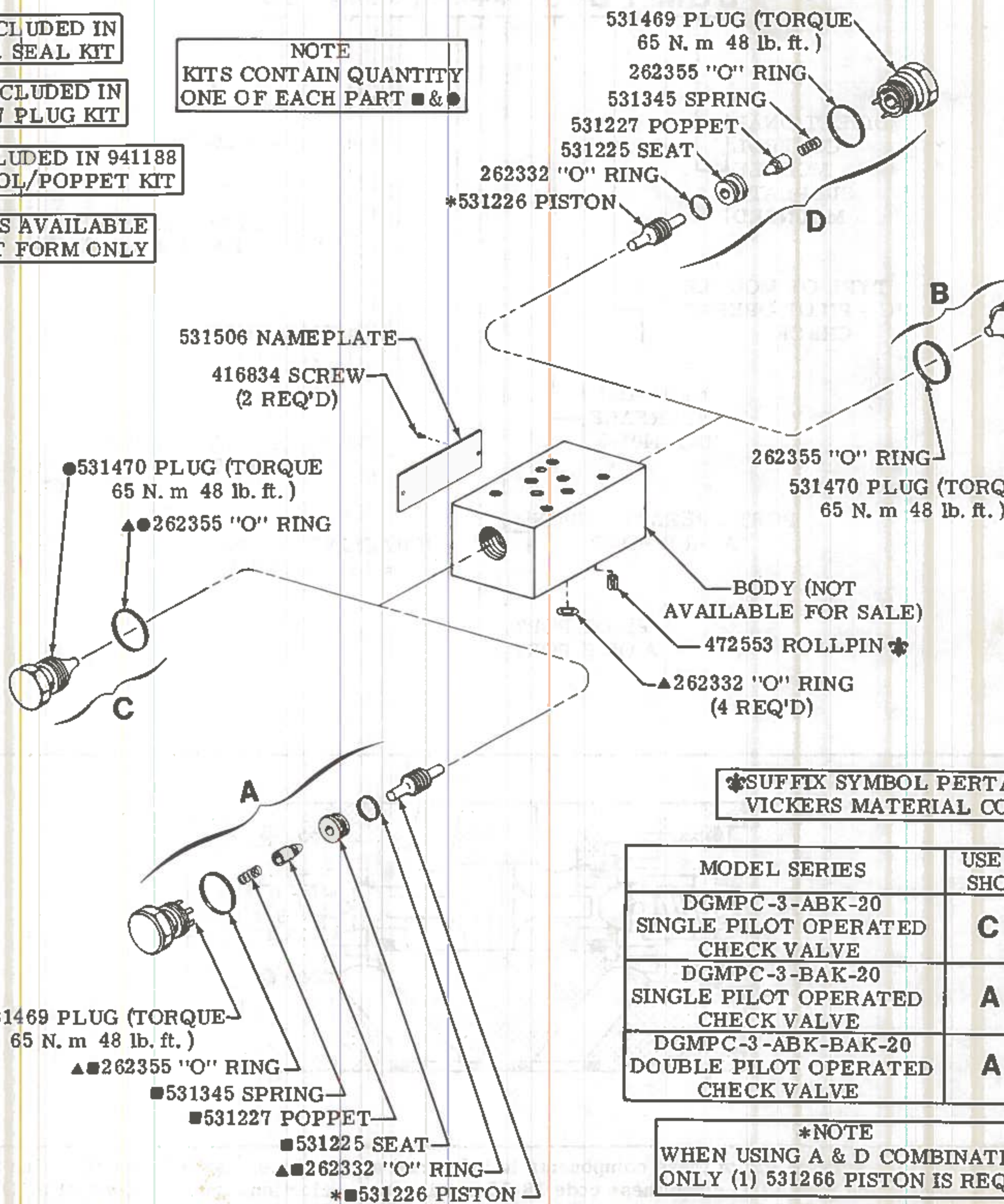
▲INCLUDED IN 941001 SEAL KIT

●INCLUDED IN 941187 PLUG KIT

■INCLUDED IN 941188 SPOOL/POPPET KIT

PARTS AVAILABLE IN KIT FORM ONLY

NOTE
KITS CONTAIN QUANTITY ONE OF EACH PART ■&●

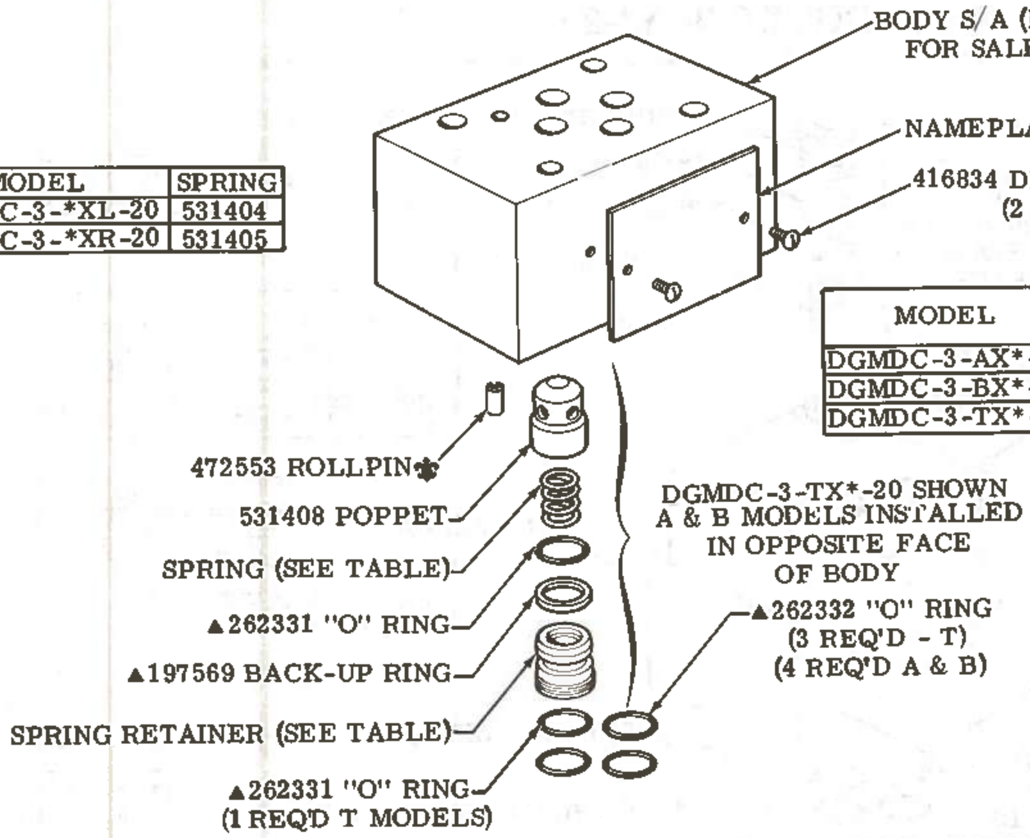


✤SUFFIX SYMBOL PERTAINS TO VICKERS MATERIAL CONTROL

MODEL SERIES	USE PARTS SHOWN IN
DGMPC-3-ABK-20 SINGLE PILOT OPERATED CHECK VALVE	C & D
DGMPC-3-BAK-20 SINGLE PILOT OPERATED CHECK VALVE	A & B
DGMPC-3-ABK-BAK-20 DOUBLE PILOT OPERATED CHECK VALVE	A & D

*NOTE
WHEN USING A & D COMBINATION, ONLY (1) 531266 PISTON IS REQ'D.

MODEL	SPRING
DGMDC-3-*XL-20	531404
DGMDC-3-*XR-20	531405



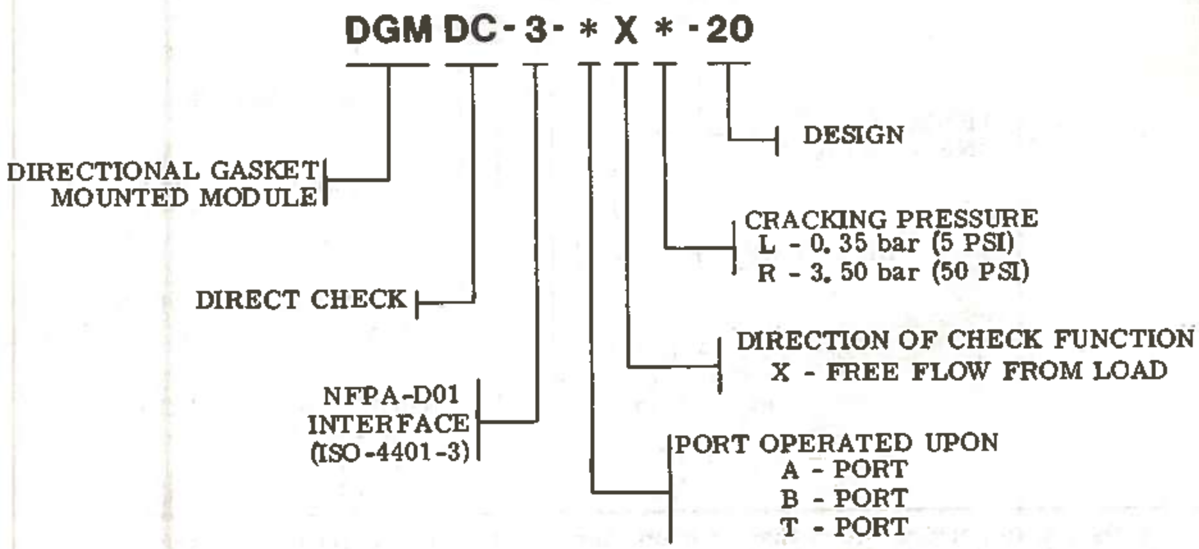
MODEL	BODY S/A	SPRING RETAINER
DGMDC-3-AX*-20	531695	531406
DGMDC-3-BX*-20	531696	531406
DGMDC-3-TX*-20	531493	531492

✽AVAILALBE ONLY IN KITS OF 25 EACH

NOTE: THIS UNIT IS OF METRIC DESIGN

▲INCLUDED IN F3 SEAL KIT 920107

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

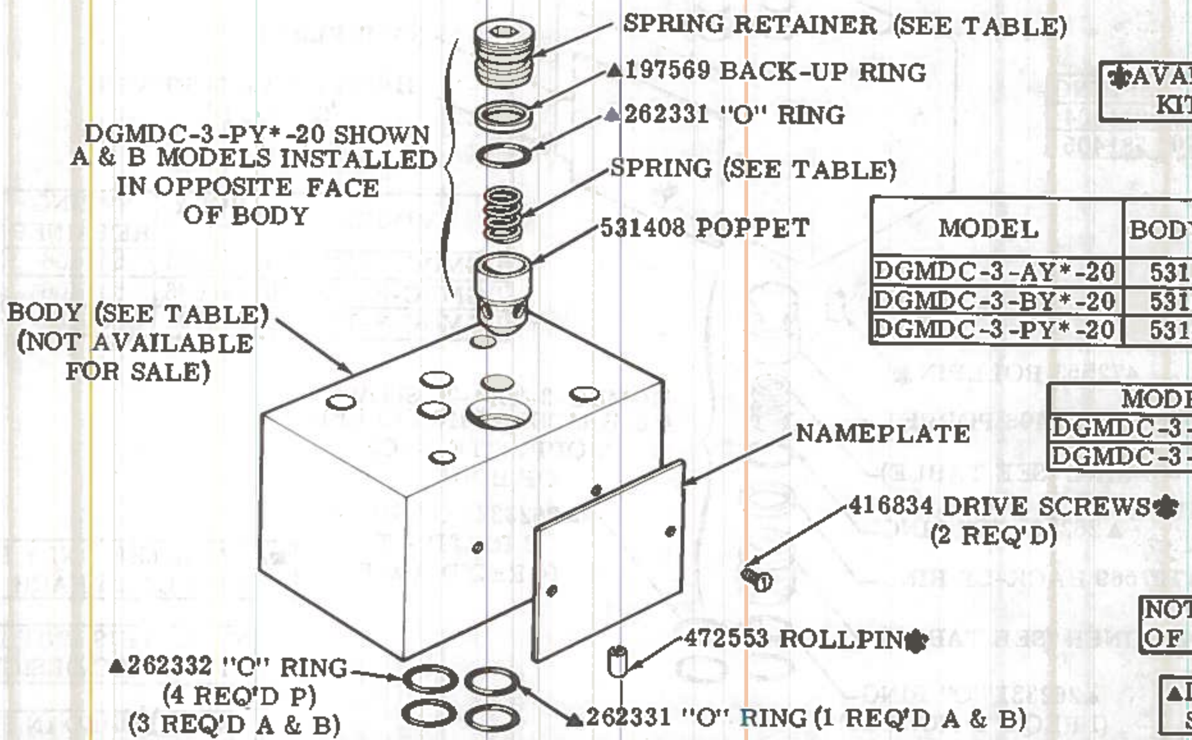
Service Parts Information

VICKERS®
A TRINOVA COMPANY

DIRECT CHECK VALVE MODULE

DGMDC-3-*X*-20

DGMDC-3-*Y*-20



✽AVAILABLE ONLY IN KITS OF 25 EACH

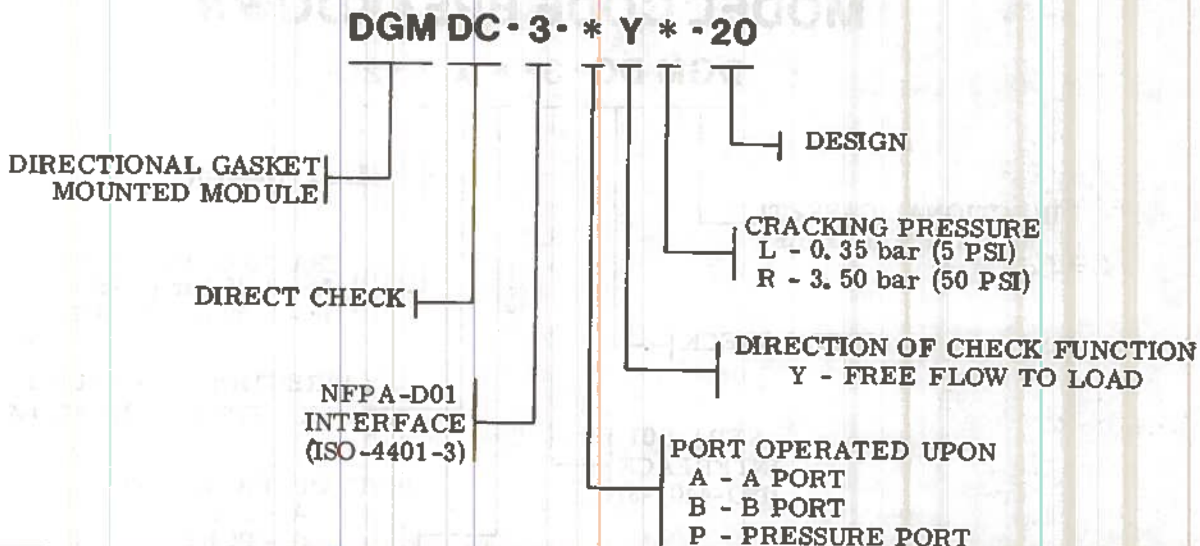
MODEL	BODY S/A	SPRING RETAINER
DGMDC-3-AY*-20	531692	531492
DGMDC-3-BY*-20	531693	531492
DGMDC-3-PY*-20	531409	531406

MODEL	SPRING
DGMDC-3-*YL-20	531404
DGMDC-3-*YR-20	531405

NOTE: THIS UNIT IS OF METRIC DESIGN

▲INCLUDED IN F3 SEAL KIT 920107

MODEL CODE BREAKDOWN



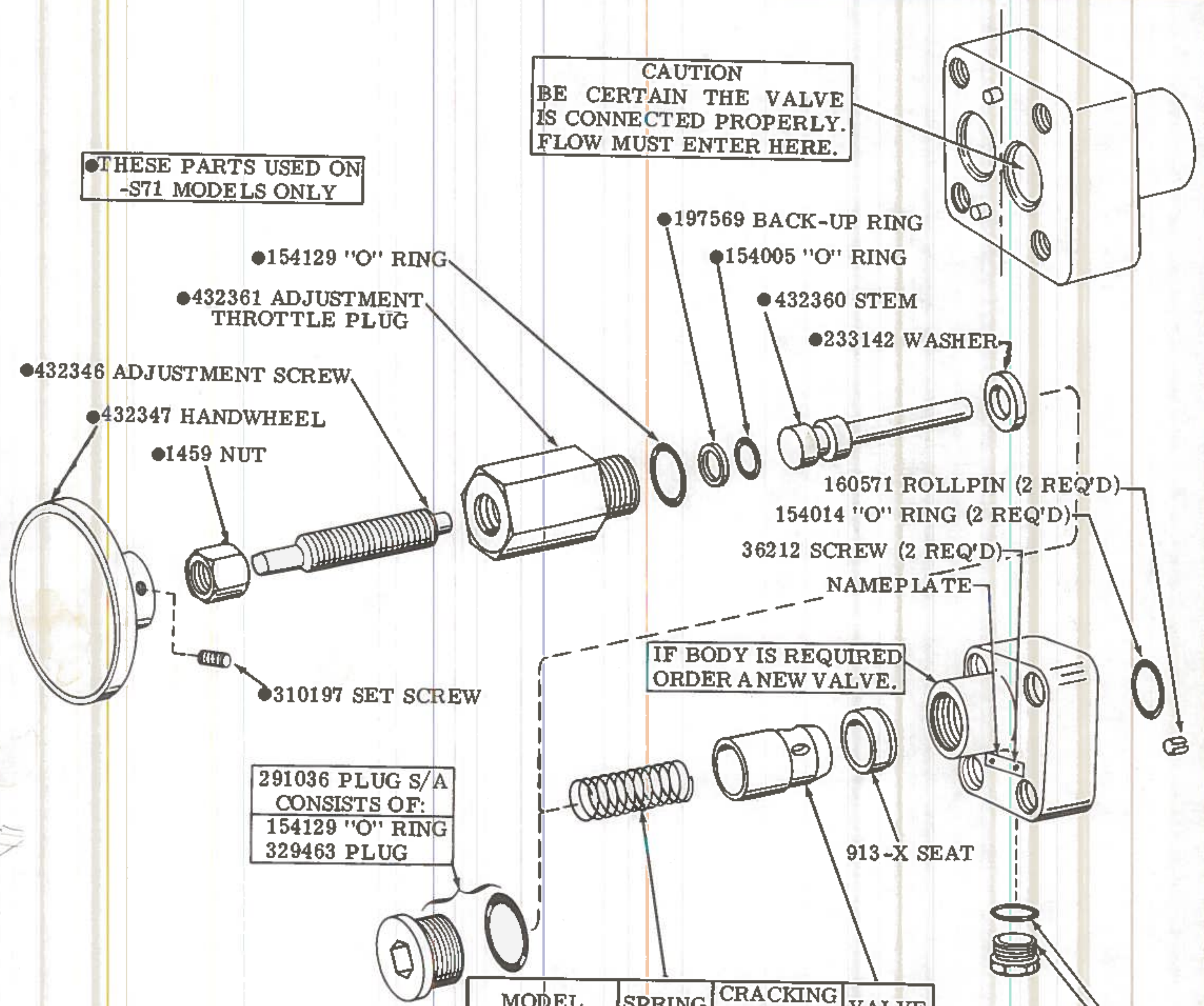
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

C5G-805-(S*)

VICKERS®
A TRINOVA COMPANY

3/8 INCH MANIFOLD MOUNTED CHECK VALVE



MODEL	SPRING	CRACKING PRESSURE	VALVE
C5G-805	2978	5	118X
C5G-805-S3	35298	50	
C5G-805-S8	55233	75	
C5G-805-S20	140804	1	
C5G-805-S71	2978	5	572289

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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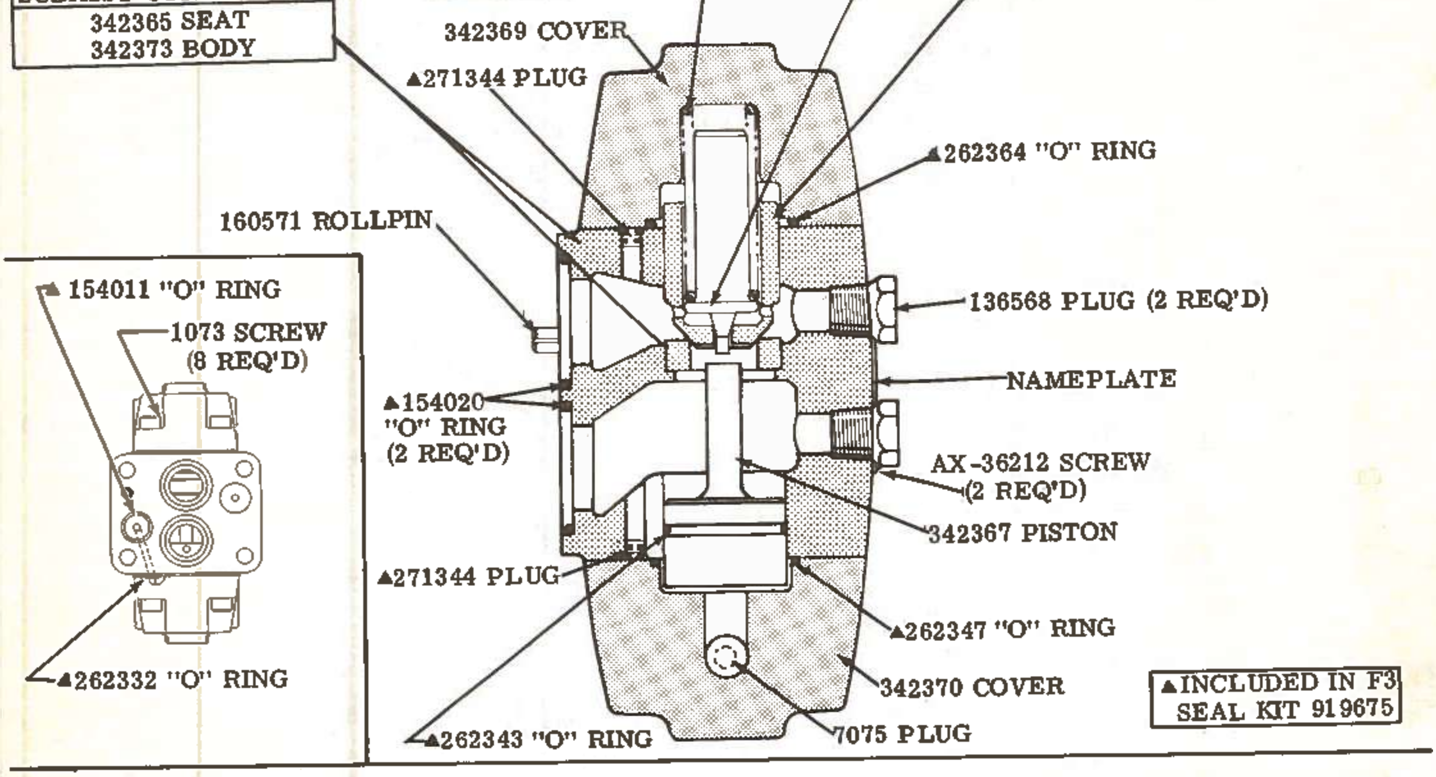
Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 5-1-85

I-3582-S

MODEL	SPRING	P.S.I.	GUIDE/ POPPET	CHECK VALVE
4CG-06-A-20	354636	30	359860	359859
4CG-06-DA-20			354644	342366
4CG-06-B-20	386660	50	359860	359859
4CG-06-C-20	388352	75		
4CG-06-DC-20			354644	342366
4CG-06-F-20	388353	150	388358	359859
4CG-06-DF-20			388359	342366

342374 BODY & SEAT SUBASSY CONSISTS OF:
342365 SEAT
342373 BODY



▲INCLUDED IN F3 SEAL KIT 919675

MODEL CODE BREAKDOWN

4C * - 06 - (D) * - 20

- 4C — PILOT OPERATED CHECK VALVE
- * — G - GASKET MOUNTED; T - THREADED CONNECTION
- 06 — 60 SERIES
- (D) — DECOMPRESSION FEATURE; OMITTED-NO DECOMPRESSION FEATURE
- * — PRESSURE RANGE
  - A 30 P.S.I.
  - B 50 P.S.I.
  - C - 75 P.S.I.
  - F - 150 P.S.I.
- 20 — DESIGN

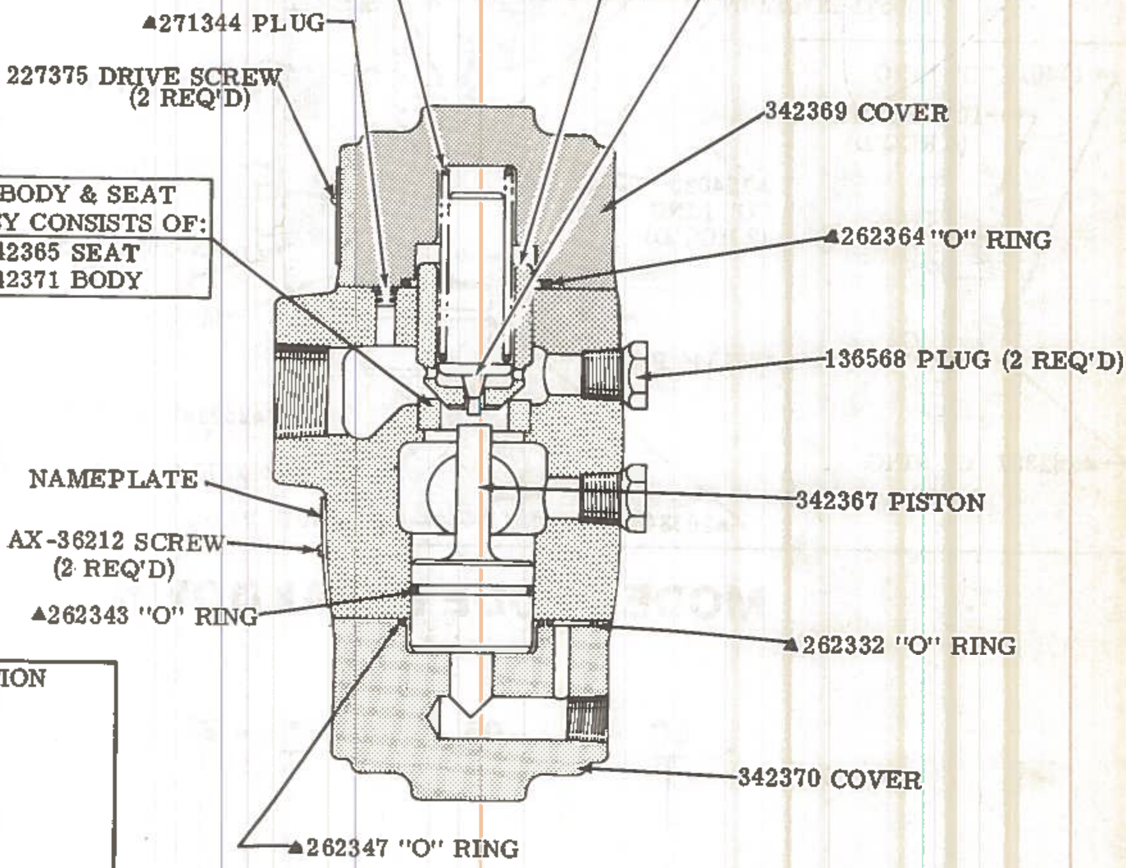
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

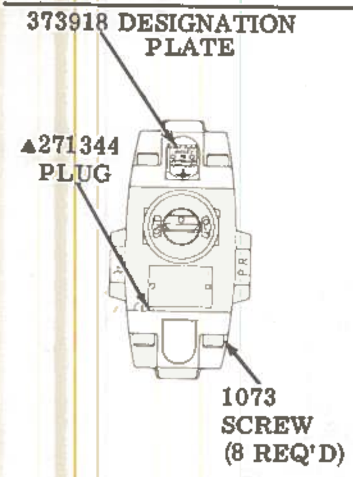
PILOT OPERATED CHECK VALVE

Service Parts Information

4CG-06-(D)*-20 4CT-06-(D)*-20

MODEL	SPRING	P.S.I.	CHECK VALVE	GUIDE/ POPPET
4CT-06-A-20	354636	30	359859	359860
4CT-06-DA-20			342366	354644
4CT-06-B-20	386660	50	359859	359860
4CT-06-C-20	388352	75		
4CT-06-DC-20			342366	354644
4CT-06-F-20	388353	150	359859	388358
4CT-06-DF-20			342366	388359





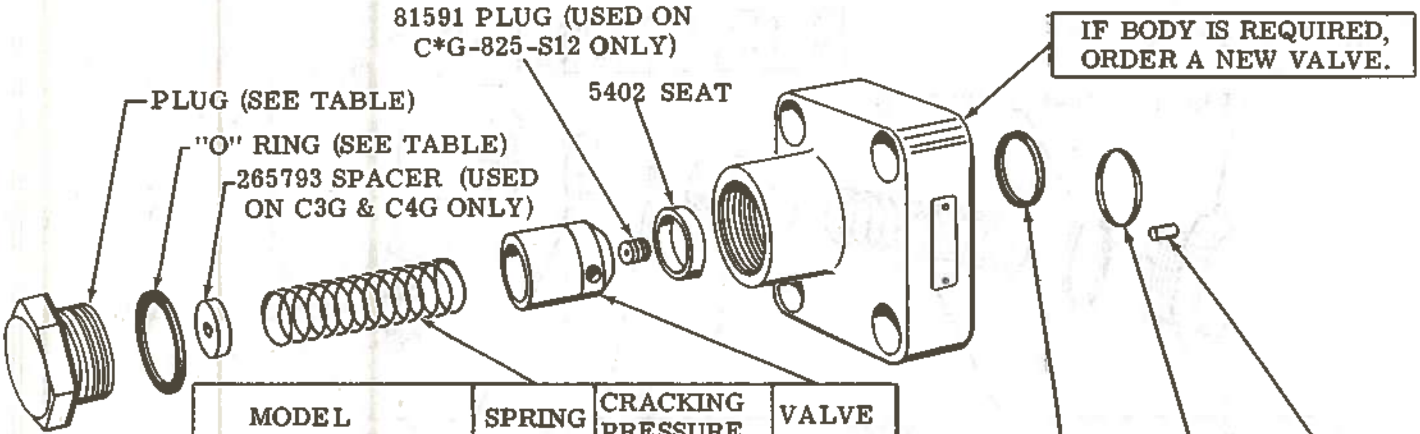
▲INCLUDED IN F3 SEAL KIT 919675

Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48084

ORDER AND USE MOUNTING BOLT KIT BK CG825-615 IF A C4G/C5G-825 VALVE IS USED TO REPLACE A C2G-825 OR A C3G-825 VALVE.

WARNING
WHEN A C5G IS USED TO REPLACE A C2G OR C3G, DRILL AN APPROPRIATE HOLE IN THE MOUNTING SURFACE TO ACCOMMODATE THE EXTRA REST PIN OF THE C5G AND PLUG THE UNUSED HOLE. THE PINS PREVENT REVERSAL OF THE VALVE ON THE MOUNTING SURFACE, WHICH COULD CAUSE A SYSTEM MALFUNCTION AND/OR INJURY OF PERSONNEL.

PLUG	"O" RING	MODEL
143137	▲154077	C2G/C3G/C4G
347831	▲161467	C5G
(TORQUE PLUG 40 - 50 lb. ft.)		



MODEL	SPRING	CRACKING PRESSURE	VALVE
C2G-825 C3G/C4G-825 C5G-825	2284	5 P.S.I.	108359
C2G-825-S2 C3G/C4G-825-S2 C5G-825-S2	2953	35 P.S.I.	
C2G-825-S3 C3G/C4G-825-S3 C5G-825-S3	29059	50 P.S.I.	
C2G-825-S8 C3G/C4G-825-S8 C5G-825-S8	39778	75 P.S.I.	
C2G-825-S12 C3G/C4G-825-S12 C5G-825-S12	2284	5 P.S.I.	182004
C2G-825-S17 C3G/C4G-825-S17 C5G-825-S17	64062	125 P.S.I.	108359
C2G-825-S19 C3G/C4G-825-S19 C5G-825-S19	106669	20 P.S.I.	
C2G-825-S20 C3G/C4G-825-S20 C5G-825-S20	2950	1 P.S.I.	
C5G-825-S44	64062	125 P.S.I.	108359

MODEL	SEALS		PIN
	INLET	OUTLET	(2 REQ'D)
C2G	42310		102679
C3G C4G C5G	▲154026	▲154077	160571

C3G/C4G/C5G-825 ▲SEAL KITS	
STANDARD	919381
F3	919382

To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

Litho in U.S.A.

Service Parts Information

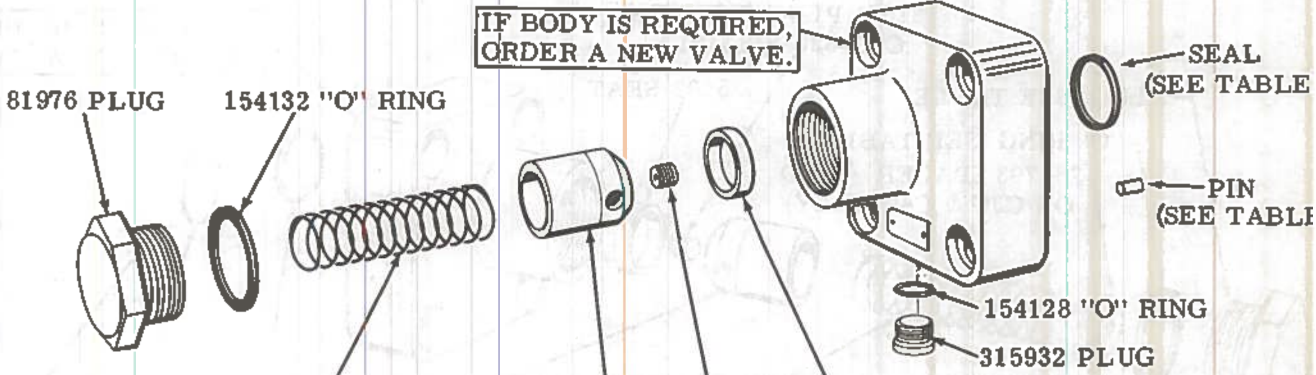
CHECK VALVES

C*G-800 SERIES

VICKERS
A TRINOVA COMPANY

*NOTE: THE VALVE SEAT IS INSTALLED THROUGH THE FRONT AS SHOWN ON THE C3G, C4G, & C5G SERIES. ON THE C2G SERIES, THE SEAT IS INSTALLED FROM THE BACK OR MOUNTING SURFACE.

WARNING
WHEN A C5G IS USED TO REPLACE A C2G OR C3G, DRILL AN APPROPRIATE HOLE IN THE MOUNTING SURFACE TO ACCOMMODATE THE EXTRA REST PIN OF THE C5G AND PLUG THE UNUSED HOLE. THE PINS PREVENT REVERSAL OF THE VALVE ON THE MOUNTING SURFACE, WHICH COULD CAUSE A SYSTEM MALFUNCTION AND/OR INJURY OF PERSONNEL.

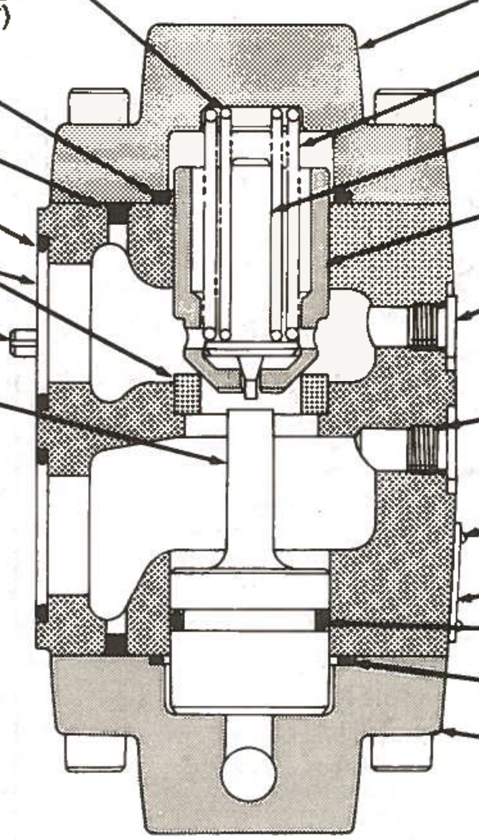


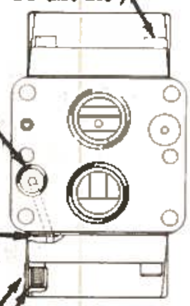
MODEL	SPRING	CRACKING PRESSURE	VALVE	PLUG	*SEAT	SEALS (2 REQ'D)	PIN (2 REQ'D)
C2G-815					104403	262395	102679
C3G/C4G-815	2943	5 P.S.I.			263886	154020	160571
C5G-815							
C2G-815-S2					104403	262395	102679
C3G/C4G-815-S2	36316	35 P.S.I.			263886	154020	160571
C5G-815-S2							
C2G-815-S3					104403	262395	102679
C3G/C4G-815-S3	25896	50 P.S.I.	81589	——	263886	154020	160571
C5G-815-S3							
C2G-815-S8					104403	262395	102679
C3G/C4G-815-S8	32999	75 P.S.I.			263886	154020	160571
C5G-815-S8							
C2G-815-S12					104403	262395	102679
C3G/C4G-815-S12	2943	5 P.S.I.	108708	81592	263886	154020	160571
C5G-815-S12							
C2G-815-S17					104403	262395	102679
C3G/C4G-815-S17	84235	125 P.S.I.			263886	154020	160571
C5G-815-S17							
C2G-815-S19					104403	262395	102679
C3G/C4G-815-S19	2287	20 P.S.I.	81589	——	263886	154020	160571
C5G-815-S19							
C2G-815-S20					104403	262395	102679
C3G/C4G-815-S20	83902	1 P.S.I.			263886	154020	160571
C5G-815-S20							

▲SERVICE ALL UNITS W/F3 SEAL KIT 919679

626530 BODY & SEAT SUBASSY INCLUDES:
342608 SEAT
626531 BODY

MODEL	SPRING	P.S.I.	GUIDE/ POPPET	CHECK VALVE
4CG-10-A-21	352444	30	359862	359863
4CG-10-DA-21			357424	342609
4CG-10-C-21	388354	75	359862	359863
4CG-10-DC-21			357424	342609
4CG-10-F-21	388355	150	388391	359863
4CG-10-DF-21			388392	342609





MODEL CODE BREAKDOWN

(F3) 4C*- 10 (D)* - 21

- (F3) — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- 4C — PILOT OPERATED CHECK VALVE
- * — G - SUBPLATE MOUNTED; S - SAE STRAIGHT THREADED CONNECTIONS; T - NPTF THREADED CONNECTIONS
- 10 — 100 SERIES
- (D) — DECOMPRESSION FEATURE (SHOWN); OMITTED - NO DECOMPRESSION FEATURE
- * — PRESSURE RANGE
  - A - 30 P.S.I.
  - C - 75 P.S.I.
  - F - 150 P.S.I
- 21 — DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

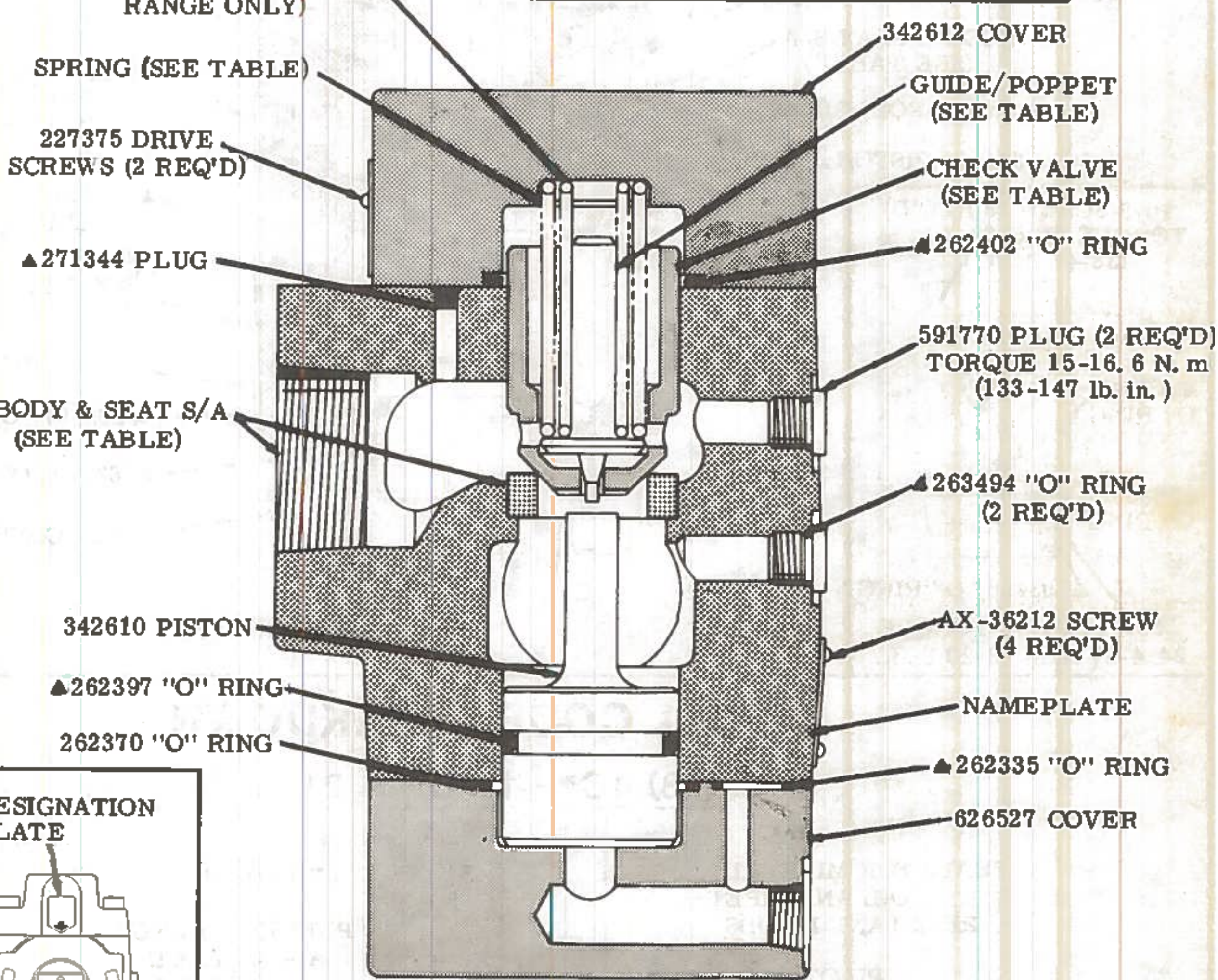
Service Parts Information

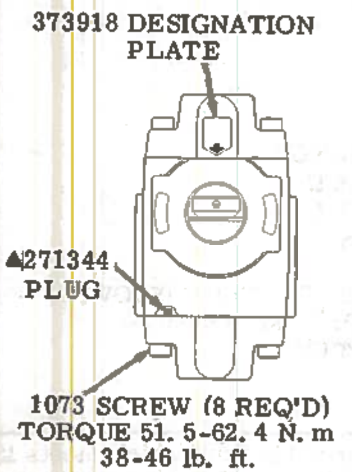
PILOT OPERATED CHECK VALVE

4CT-10-(D)*-21
4CS-10-(D)*-21
4CG-10-(D)*-21

VICKERS
A TRINOVA COMPANY

MODEL	SPRING	P.S.I.	CHECK VALVE	GUIDE/ POPPET
4C*-10-A-21	352444	30	359863	359862
4C*-10-DA-21			342609	357424
4C*-10-C-21	388354	75	359863	359862
4C*-10-DC-21			342609	357424
4C*-10-F-21	388355	150	359863	388391
4C*-10-DF-21			342609	388392





MODEL	■BODY S/A	BODY	SEAT
4CS-10-(D)*-21	626615	626616	342608
4CT-10-(D)*-21	626528	626529	342608

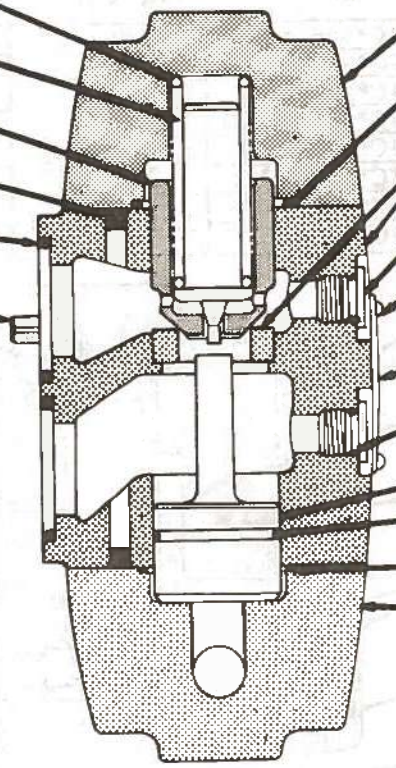
▲SERVICE ALL UNITS W/F3 SEAL KIT 919677

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

4CG-06-(D)*-21

626507 BODY & SEAT SUBASSY INCLUDES:
342365 SEAT 626508 BODY

MODEL	SPRING	P.S.I.	GUIDE/ POPPET	CHECK VALVE
4CG-06-A-21	354636	30	359860	359859
4CG-06-DA-21			354644	342366
4CG-06-B-21	386660	50	359860	359859
4CG-06-DB-21			354644	342366
4CG-06-C-21	388352	75	359860	359859
4CG-06-DC-21			354644	342366
4CG-06-F-21	388353	150	388358	359859
4CG-06-DF-21			388359	342366



▲SERVICE ALL UNITS W/F3 SEAL KIT 919675

MODEL CODE BREAKDOWN

(F3) 4C * - 06 - (D) * - 21

- (F3) — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- 4C — PILOT OPERATED CHECK VALVE
- * — G - GASKET MOUNTED; S - SAE THREADED CONNECTIONS; T - NPTF THREADED CONNECTIONS
- 06 — 60 SERIES
- (D) — DECOMPRESSION FEATURE (SHOWN); OMITTED - NO DECOMPRESSION FEATURE
- * — PRESSURE RANGE
  - A - 30 P.S.I.
  - B - 50 P.S.I.
  - C - 75 P.S.I.
  - F - 150 P.S.I.
- 21 — DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

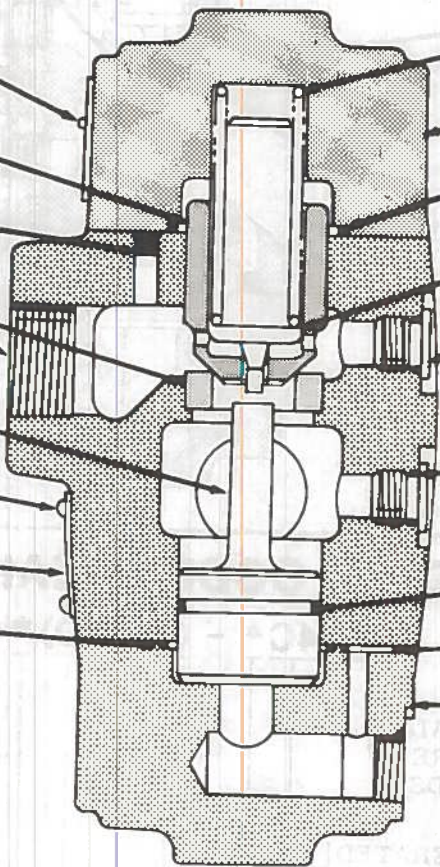
Service Parts Information

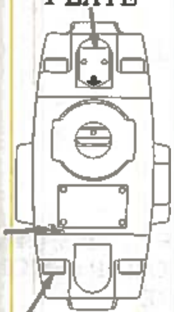
VICKERS
A TRINOVA COMPANY

PILOT OPERATED CHECK VALVE

4CT-06-(D)*-21
4CS-06-(D)*-21
4CG-06-(D)*-21

MODEL	SPRING	P.S.I.	CHECK VALVE	GUIDE/ POPPET
4C*-06-A-21	354636	30	359859	359860
4C*-06-DA-21			342366	354644
4C*-06-B-21	386660	50	359859	359860
4C*-06-DB-21			342366	354644
4C*-06-C-21	388352	75	359859	359860
4C*-06-DC-21			342366	354644
4C*-06-F-21	388353	150	359859	388358
4C*-06-DF-21			342366	388359





MODEL	■BODY S/A	BODY	SEAT
4CS-06-(D)*-21	626607	626608	342365
4CT-06-(D)*-21	626505	626506	342365

▲SERVICE ALL UNITS W/F3 SEAL KIT 919675

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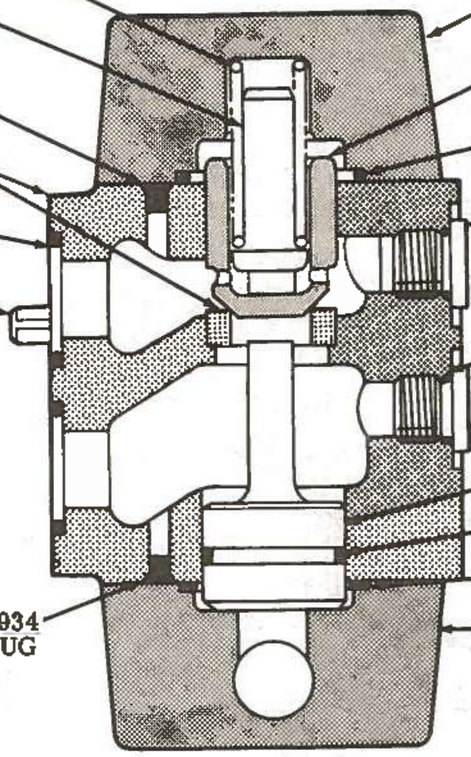
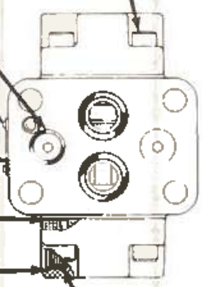
▲SERVICE ALL UNITS W/F3 SEAL KIT 919671

626485 BODY & SEAT S/A INCLUDES:
342224 SEAT
626486 BODY

MODEL	SPRING	PRESSURE P. S. I.	CHECK VALVE	GUIDE/ POPPET
4CG-03-A-21	352439	30	359861	359858
4CG-03-DA-21			342225	352440
4CG-03-B-21	398302	50	359861	359858
4CG-03-DB-21			342225	352440
4CG-03-C-21	388350	75	359861	359858
4CG-03-DC-21			342225	352440
4CG-03-F-21	388351	150	359861	388357
4CG-03-DF-21			342225	388356





MODEL CODE BREAKDOWN

(F3) - 4C* - 03 - (D)* - 21

- (F3) — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- 4C — PILOT OPERATED CHECK VALVE
- * — G - SUBPLATE MOUNTED; S - SAE STRAIGHT THD CONNECTION; T - NPTF THREADED CONNECTION
- 03 — 30 SERIES
- (D) — DECOMPRESSION FEATURE; OMITTED - NO DECOMPRESSION FEATURE (SHOWN)
- * — PRESSURE RANGE
  - A - 30 P. S. I.
  - B - 50 P. S. I.
  - C - 75 P. S. I.
  - D - 150 P. S. I.
- 21 — DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

PILOT OPERATED CHECK VALVE

4CT-03-(D)*-21
4CS-03-(D)*-21
4CG-03-(D)*-21

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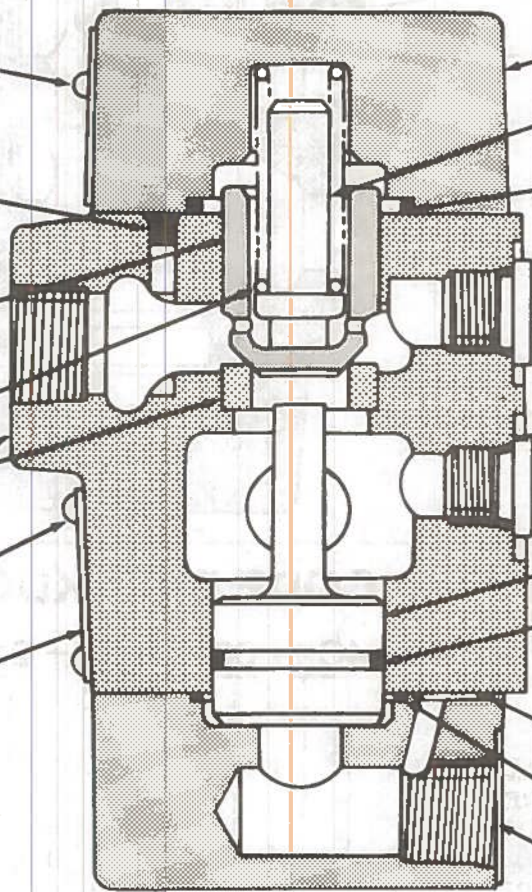
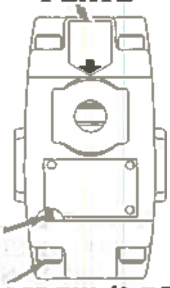
MODEL	SPRING	PRESSURE P.S.I.	CHECK VALVE	GUIDE/ POPPET
4C*-03-A-21	352439	30	359861	359858
4C*-03-DA-21			342225	352440
4C*-03-B-21	398302	50	359861	359858
4C*-03-DB-21			342225	352440
4C*-03-C-21	388350	75	359861	359858
4C*-03-DC-21			342225	352440
4C*-03-F-21	388351	150	359861	388357
4C*-03-DF-21			342225	388356





MODEL	■BODY S/A	BODY	SEAT
4CS-03-(D)*-21	626550	626551	342224
4CT-03-(D)*-21	626483	626484	

▲SERVICE ALL UNITS W/F3 SEAL KIT 919668

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Service Parts Information

RIGHT ANGLE CHECK VALVES C2S-800 SERIES

C2S-805-(S**)
C2S-815-(S**)
C2S-825-(S**)

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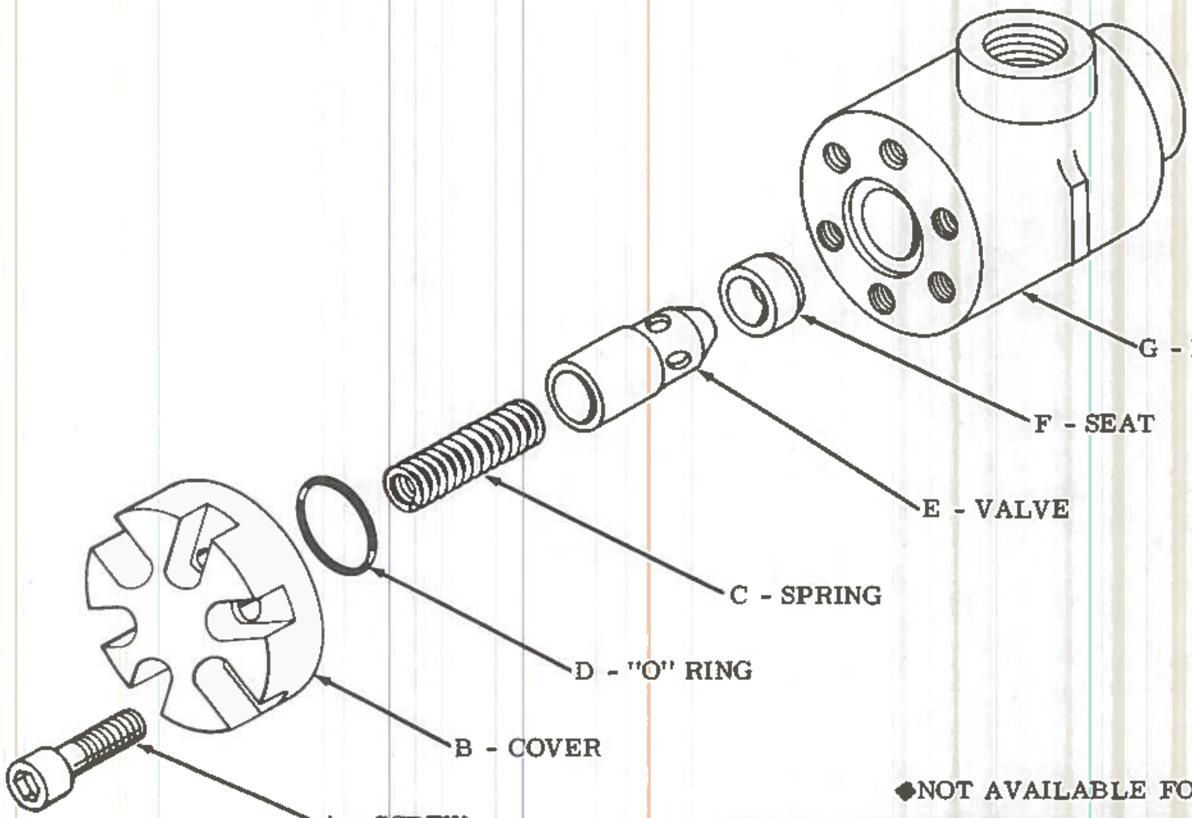

◆NOT AVAILABLE FOR SALE

WHEN ORDERING REPLACEMENT PARTS, FURNISH COMPLETE MODEL NUMBER & PART NUMBER. DO NOT ORDER BY INDEX REFERENCE ALONE.

TUBE SIZE O. D.	MODEL	A SCREW (6 REQ'D)	◆B COVER	C SPRING	CRACKING PRESSURE (P. S. I.)	D "O" RING	E VALVE	F SEAT	◆G BODY
½"	C2S-805	1050	5657	2978	5	262339	118-X	913-X	591583
	C2S-805-S3			35298	50				
	C2S-805-S8			55233	75				
	C2S-805-S19			65915	20				
3/4"	C2S-815	1071	94099	2943	5	262395	2714	2715	591577
	C2S-815-S3			25896	50				
	C2S-815-S8			32999	75				
	C2S-815-S19			2287	20				
1-1/4"	C2S-825	1073	94097	2284	5	262402	2587	2937	591580
	C2S-825-S3			29059	50				
	C2S-825-S8			39778	75				
	C2S-825-S19			106669	20				

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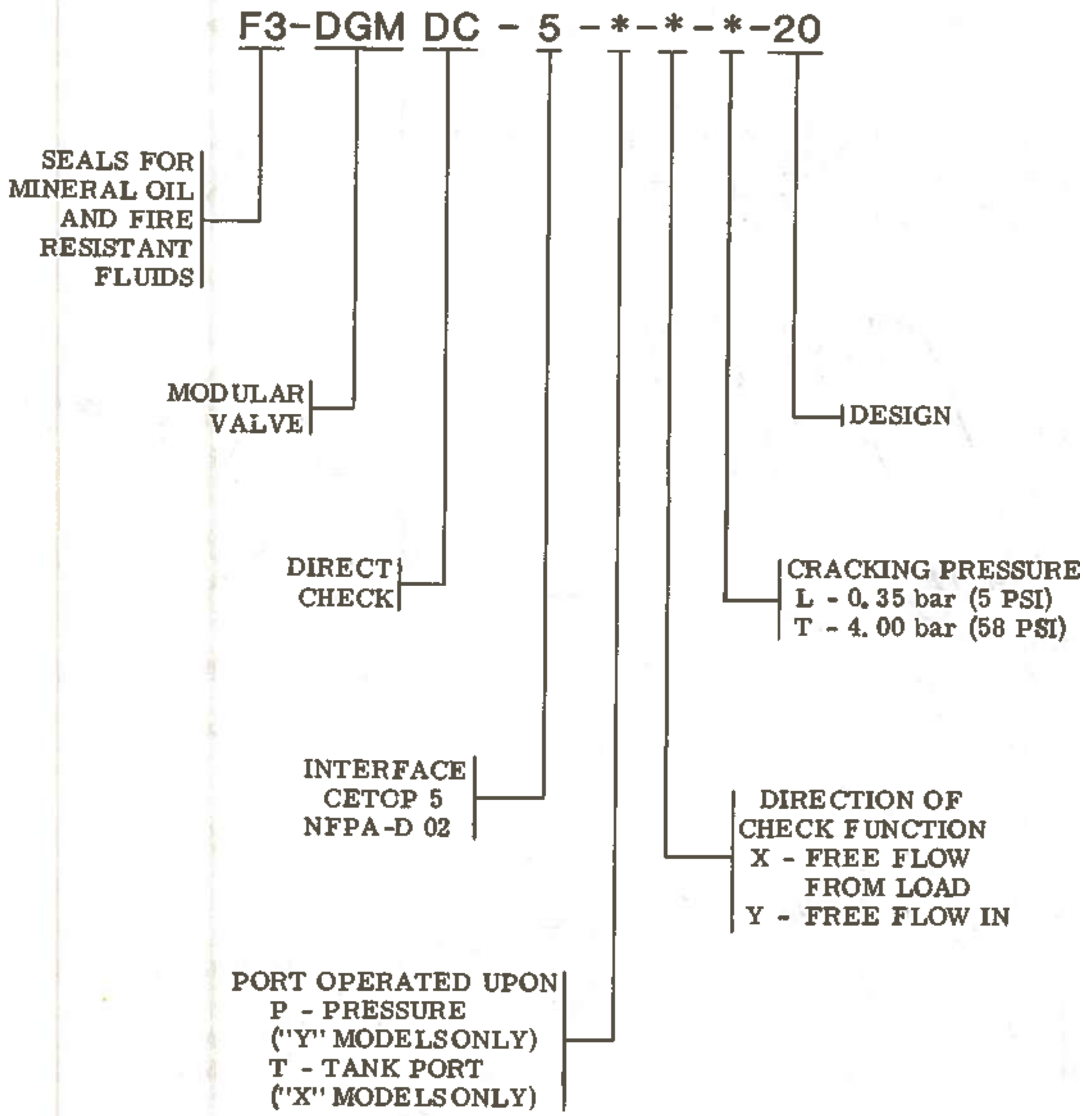
MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

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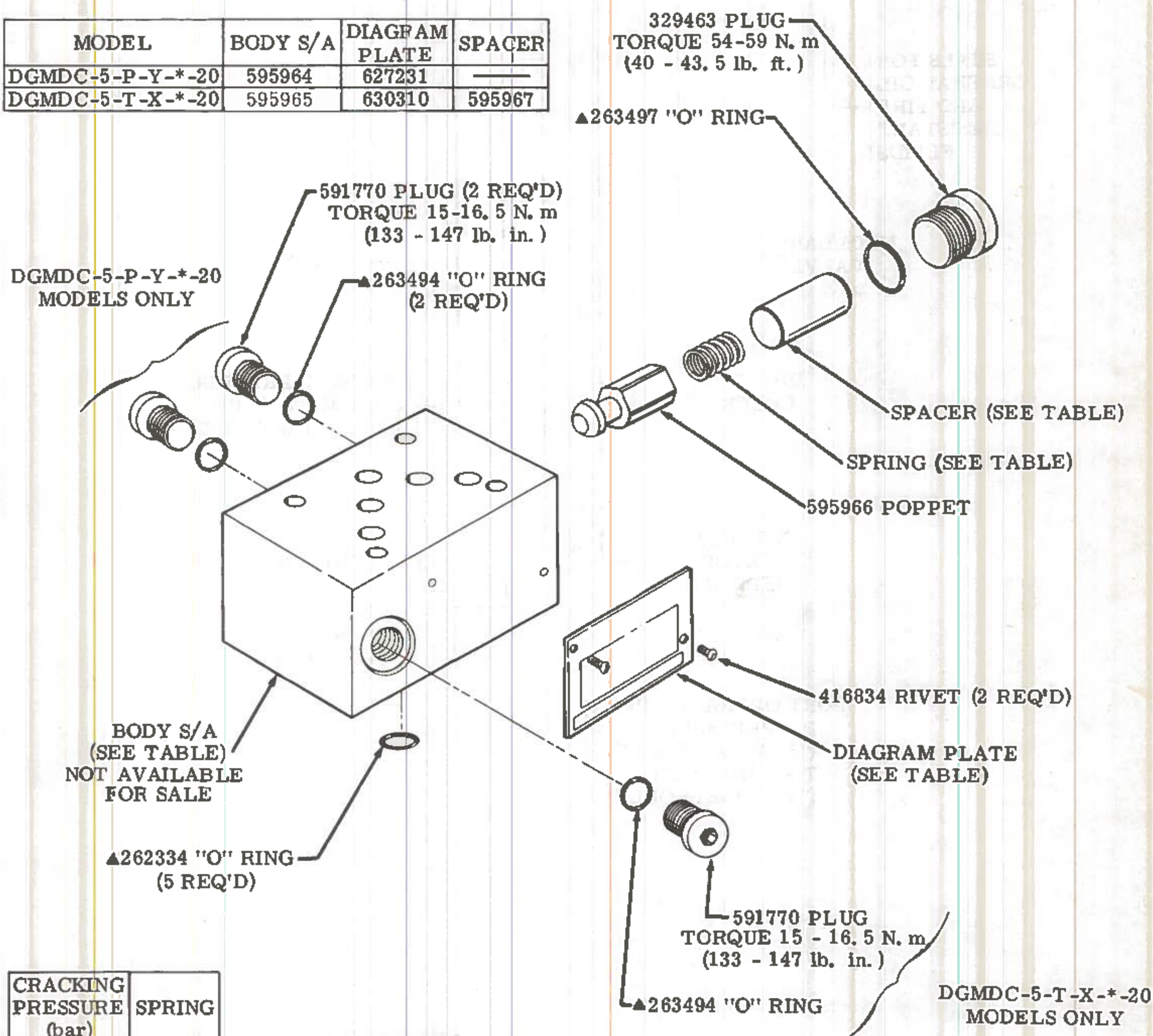
DIRECT CHECK VALVE MODULE

DGMDC-5-T-X-*-20

DGMDC-5-P-Y-*-20

MODEL	BODY S/A	DIAGRAM PLATE	SPACER
DGMDC-5-P-Y-*-20	595964	627231	———
DGMDC-5-T-X-*-20	595965	630310	595967



CRACKING PRESSURE (bar)	SPRING
0. 35	595980
4. 00	595981

▲SERVICE ALL UNITS W/F3 SEAL KIT 920247

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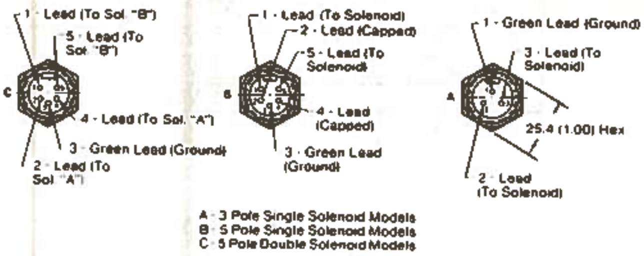
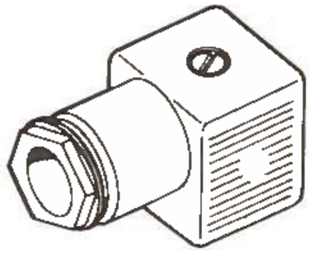
ELECTRICAL CONNECTOR



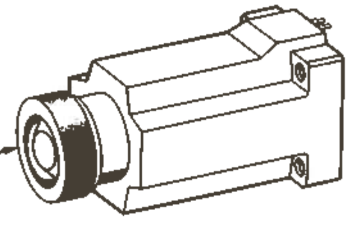
CONNECTOR TYPE	PART NUMBER	WARNING TAG
3 PIN	400784	400881
5 PIN	409706	400882
ELECTRICAL POWER MUST BE DISCONNECTED BEFORE REMOVING OR REPLACING ELECTRICAL PLUG		

DIN STANDARD RECEPTACLE

DIN RECEPTACLE	PART NUMBER
A SOLENOID (GRAY)	710776
B SOLENOID (BLACK)	710775



MANUAL OVERRIDE



500370 MANUAL OVERRIDE END CAP

MODEL CODE BREAKDOWN

KDG-*-8-OL-(*)-**-11-***-***-*-M**

PROPORTIONAL TYPE DIRECTIONAL VALVE (KDG)

SPOOL SPRING ARRANGEMENT
- F - 3 POSITION - SPRING CENTERED
- GF - 2 POSITION - SPRING CENTERED SOLENOID A
- JF - 2 POSITION - SPRING CENTERED SOLENOID B

NOMINAL VALVE SIZE
- 8 - NFPA-D06 ISO-4401-08

SYSTEM OPEN LOOP

SPOOL TYPES
- CY - ALL PORTS BLOCKED. ACTUATOR METERED TO TANK.
- CZ - ALL PORTS BLOCKED. PRESSURE METERED TO ACTUATOR.
- FFXZ - P BLOCKED. A & B RESTRICTED TO TANK. PRESSURE METERED TO ACTUATOR.

SPOOL SIZE @ 150 PSI Δp 10 bar Δp
- 10 - 10 GPM, 38 l/min (CY ONLY)
- 20 - 20 GPM, 76 l/min (CY ONLY)
- 40 - 40 GPM, 152 l/min (CY ONLY)
- 60 - 60 GPM, 227 l/min (CY, CZ, FFXZ)

DESIGN (11)

PILOT SOURCE & CONTROL
- E - EXTERNAL PILOT EXTERNAL DRAIN
- ET - EXTERNAL PILOT INTERNAL DRAIN
- W - INTERNAL PILOT EXTERNAL DRAIN WITH REDUCER
- EW - EXTERNAL PILOT EXTERNAL DRAIN WITH REDUCER
- TW - INTERNAL PILOT INTERNAL DRAIN WITH REDUCER
- ETW - EXTERNAL PILOT INTERNAL DRAIN WITH REDUCER

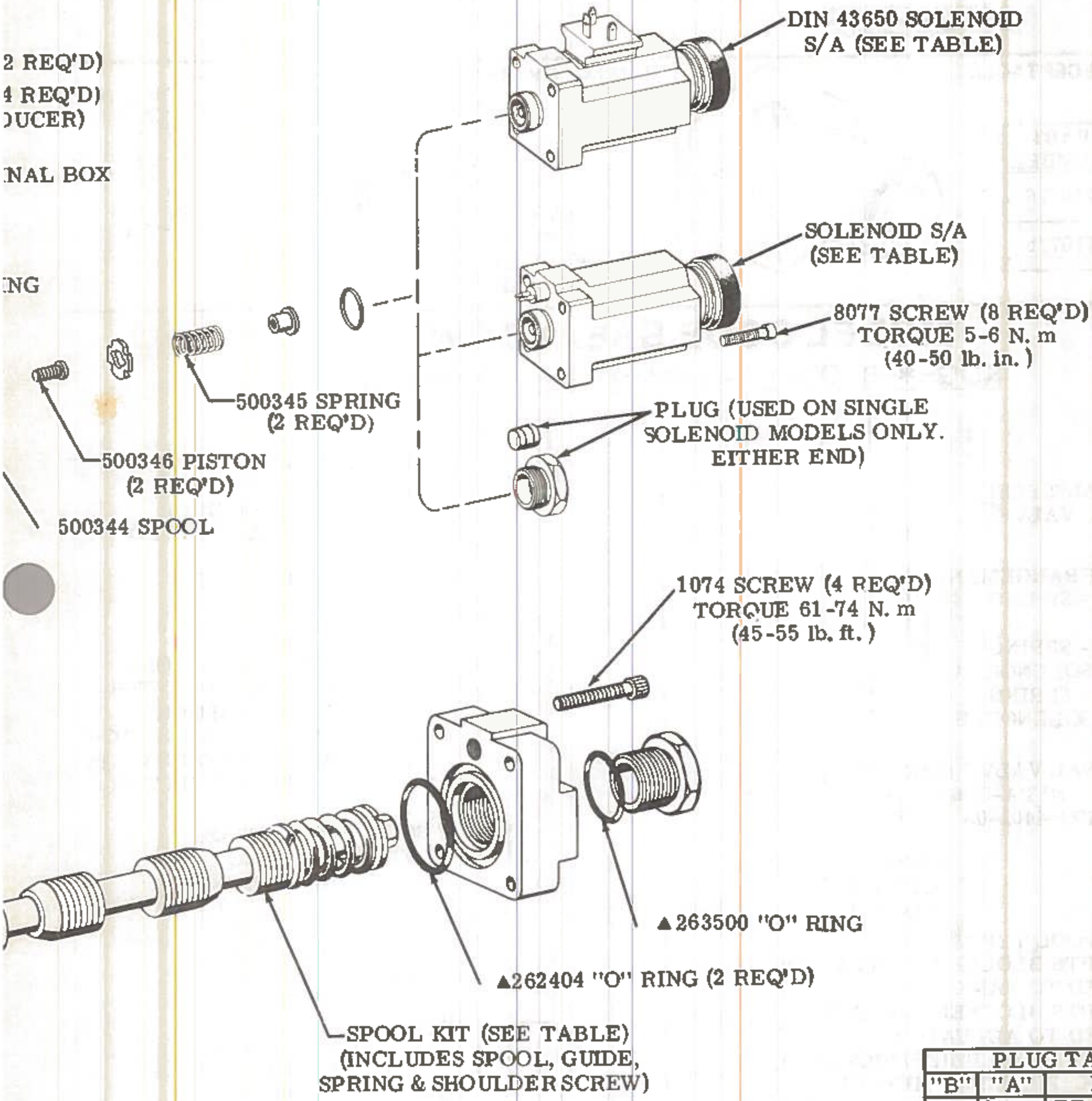
ELECTRICAL OPTIONS
- WP - WIRING HOUSING WITH TERMINAL BLOCK
- PA3 - 3 PIN TYPE CONNECTOR
- PA5 - 5 PIN TYPE CONNECTOR
- U - DIN 43650 CONNECTOR

COIL VOLTAGE
- G - 12 VDC
- H - 24 VDC

OVERRIDE OPTION
- M - MANUAL OVERRIDE
- BLANK - OMITTED

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

DIN 43650 S/A	SOLENOID S/A	VOLTAGE	OVERRIDE OPTION
500338	500336	12 VDC	WITHOUT
500339	500337	24 VDC	OVERRIDE
500342	500340	12 VDC	WITH
500343	500341	24 VDC	OVERRIDE

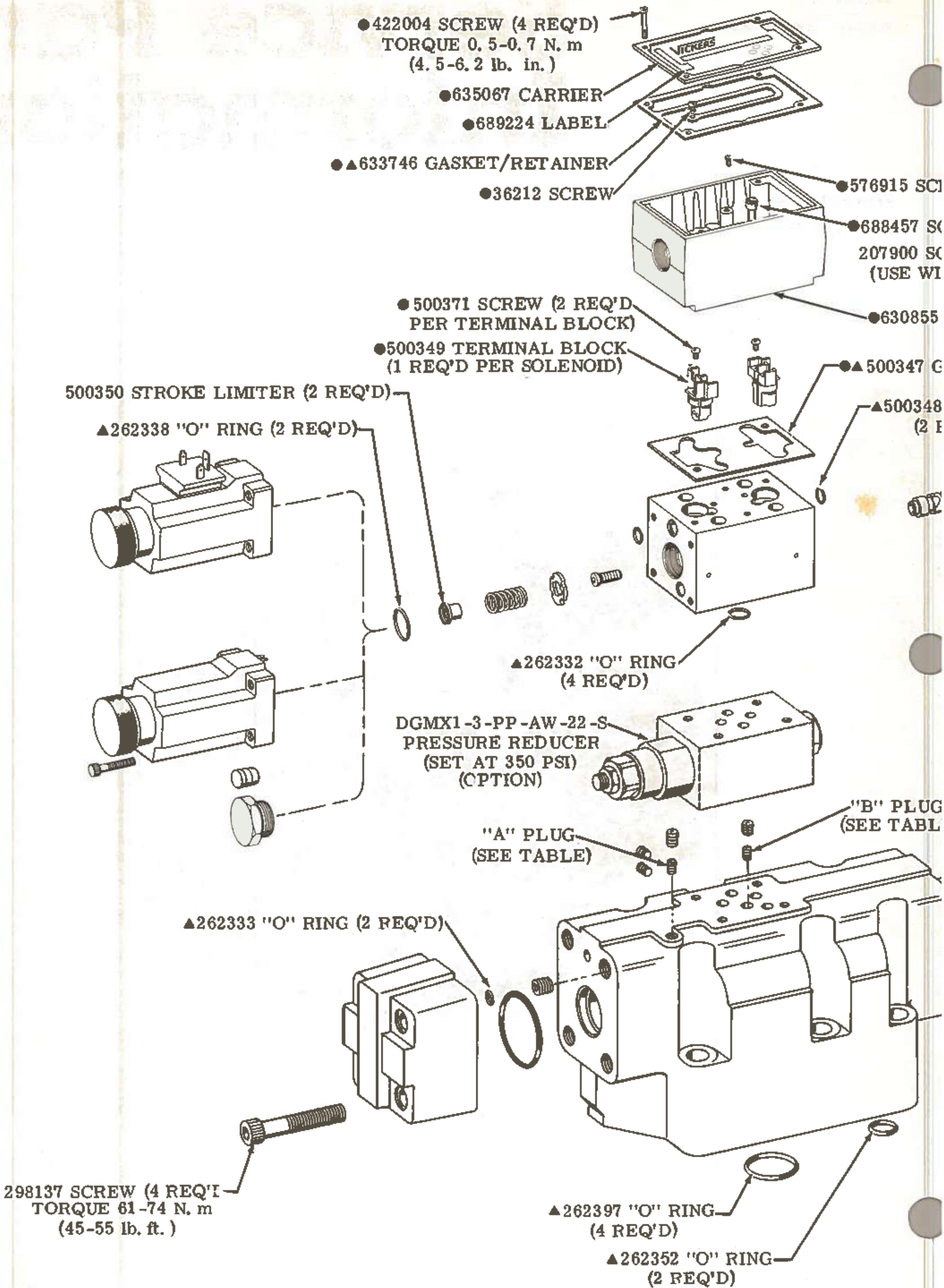


PLUG TABLE		
"B"	"A"	MODEL
—	OMIT	ET, TW, ETW
USE	—	E, ET, EW, ETW

SPOOL KIT	TYPE
926554	CY-10
926555	CY-20
926556	CY-40
926557	CY-60
926558	CZ-60
926559	FFXZ-60

▲INCLUDED IN 920342 SEAL KIT

●OMIT WHEN USING DIN 43650 COILS



●422004 SCREW (4 REQ'D)
TORQUE 0. 5-0. 7 N. m
(4. 5-6. 2 lb. in.)
●635067 CARRIER
●689224 LABEL
●▲633746 GASKET/RETAINER
●36212 SCREW
●576915 SC
●688457 S
207900 S
(USE WI
●630855
●500371 SCREW (2 REQ'D
PER TERMINAL BLOCK)
●500349 TERMINAL BLOCK
(1 REQ'D PER SOLENOID)
●▲500347 G
▲500348
500350 STROKE LIMITER (2 REQ'D)
▲262338 "O" RING (2 REQ'D)
▲262332 "O" RING
(4 REQ'D)
DGMX1-3-PP-AW-22-S
PRESSURE REDUCER
(SET AT 350 PSI)
(OPTION)
"B" PLUG
(SEE TABL
"A" PLUG
(SEE TABLE)
▲262333 "O" RING (2 REQ'D)
298137 SCREW (4 REQ'I
TORQUE 61-74 N. m
(45-55 lb. ft.)
▲262397 "O" RING
(4 REQ'D)
▲262352 "O" RING
(2 REQ'D)

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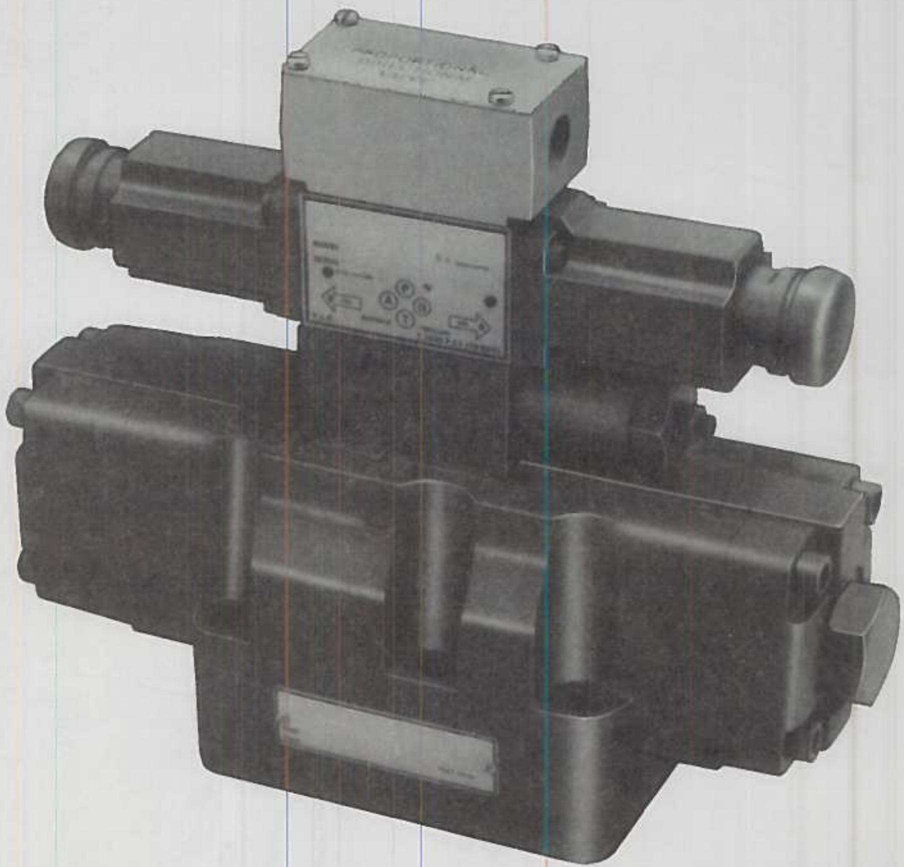
Service Parts Information

Proportional Type Directional Valve

KDG(*)F-8-0L-(**)**-**-11-(**)*-(**)*-*-(M)



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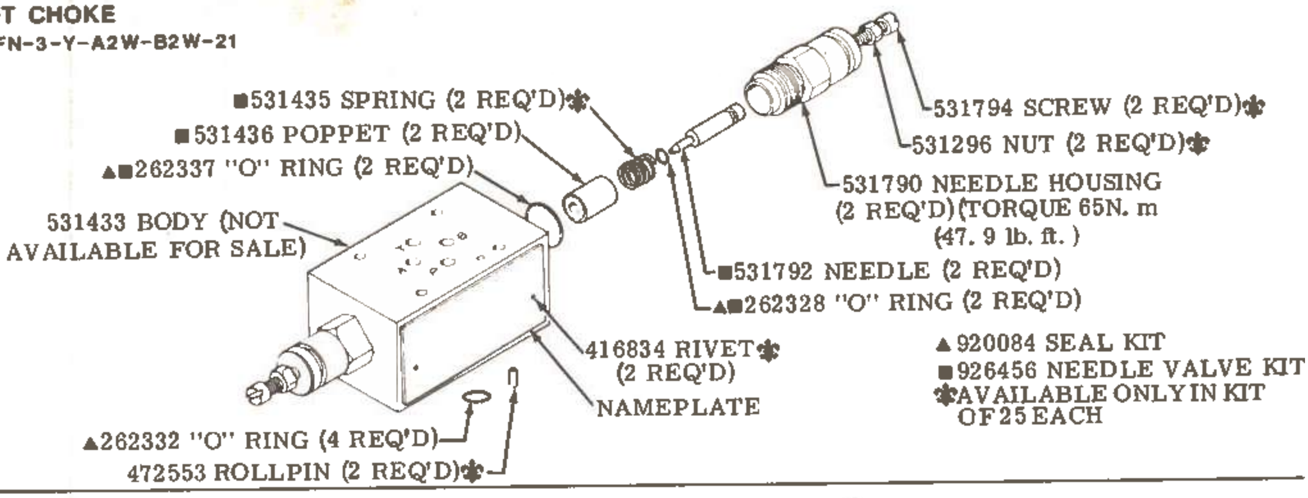
Revised 12-1-87 **I-3899-S**

PILOT CHOKE
DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN

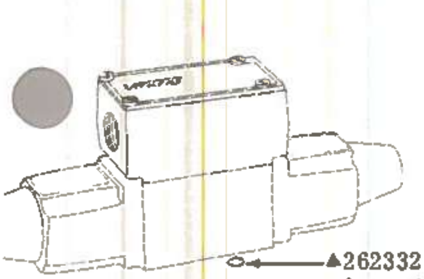
(F3)DG5S-8-*D(X)-(*)-(E)-(T)(*)-M(P)-**-*-(9)-(**)-20**

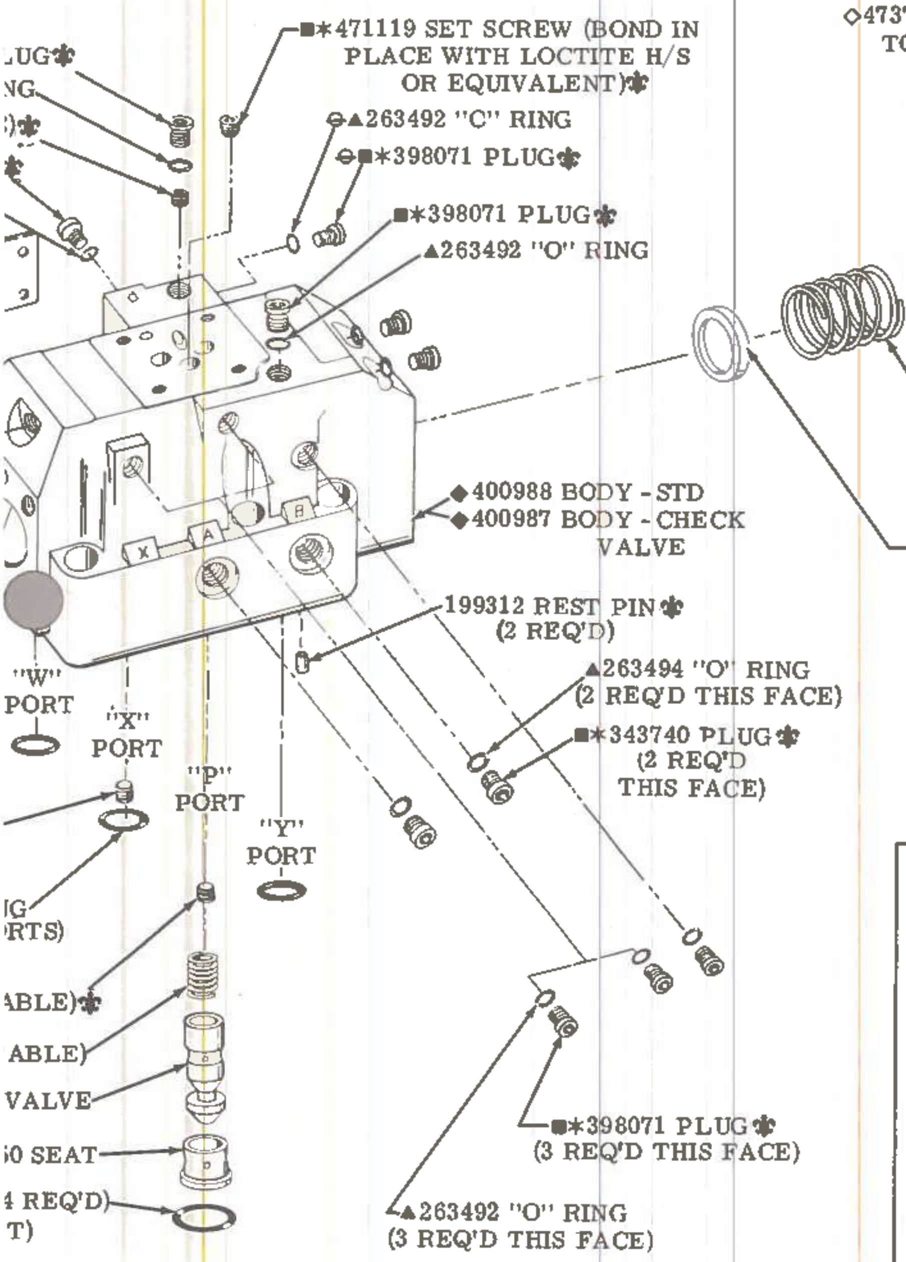
- SEALS FOR MINERAL OIL & FIRE RESISTANT FLUIDS
- DIRECTIONAL CONTROL VALVE MANIFOLD OR SUBPLATE MOUNTED. SOLENOID CONTROLLED PILOT OPERATED. RATED PRESS. 210 bar (3000 PSI)
- INTERFACE NFPA-D06 (ISO-4401-08)
- SPOOL TYPES
- D - PRESSURE CENTERED
- X - FAST RESPONSE (OMIT FOR STD. LOW SHOCK MODELS.)
- SPOOL CONTROL MODIFICATION *
  - 2 - PILOT CHOKE ADJUSTMENT
  - 8 - STROKE ADJ. CYL. "B" ONLY
  - 2-8 - DUAL PILOT CHOKE & STROKE ADJ. "B" PORT END ONLY.
- E - EXTERNAL PILOT PRESSURE *
- T - INTERNAL PILOT DRAIN *
- CHECK VALVE IN PRESSURE PORT *
  - K - 0.35 bar (5 PSI CRACKING PRESS.)
  - R - 3.45 bar (50 PSI CRACKING PRESS.)
  - S - 5.20 bar (75 PSI CRACKING PRESS.)
- FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS.
- ELECTRICAL FEATURES REFER TO I-3866-S FOR DETAILED INFORMATION
- U - DIN 43650
  - W - WIRING HSG. 1/2 NPT. THD.
  - WL - WIRING HSG. 1/2 NPT. THD. (WITH INDICATOR LIGHT)
- COIL IDENTIFICATION LETTER
- LOW WATTAGE B COIL *
- PILOT VALVE PORT ORIFICE *
- DESIGN

* OMIT WHEN NOT REQ'D

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

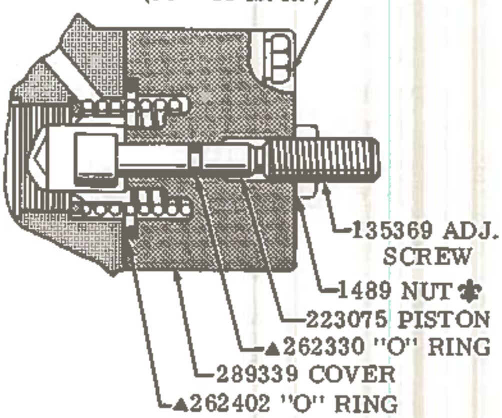
■PLUG INSTALLATION TABLE			
MODEL	"A"PLUG	"B"PLUG	"C"PLUG
DG5S-8-*D-*-M-*-20	DOES NOT EXIST	237588	——
DG5S-8-*D-*-E-M-*-20		113000	237588
DG5S-8-*D-*-X-M-*-20		——	
DG5S-8-*D-*-E-X-M-*-20		113000	
DG5S-8-*D-*-KRS-M-*-20	237588	DOES NOT EXIST	
DG5S-8-*D-*-E-KRS-M-*-20	113000		237588
DG5S-8-*D-*-X-KRS-M-*-20			
DG5S-8-*D-*-E-X-KRS-M-*-20	113000		
113000 PLUG (SOLID)✽ 237588 PLUG (ORIFICE)✽			





- PARTS PREFIXED WITH SYMBOL AVAILABLE ONLY IN KITS
- ALL THREADED FASTENERS ARE METRIC

PARTS SHOWN INCLUDED IN STROKE ADJ. KIT 941154. STROKE ADJ. CYL. "B" END ONLY.



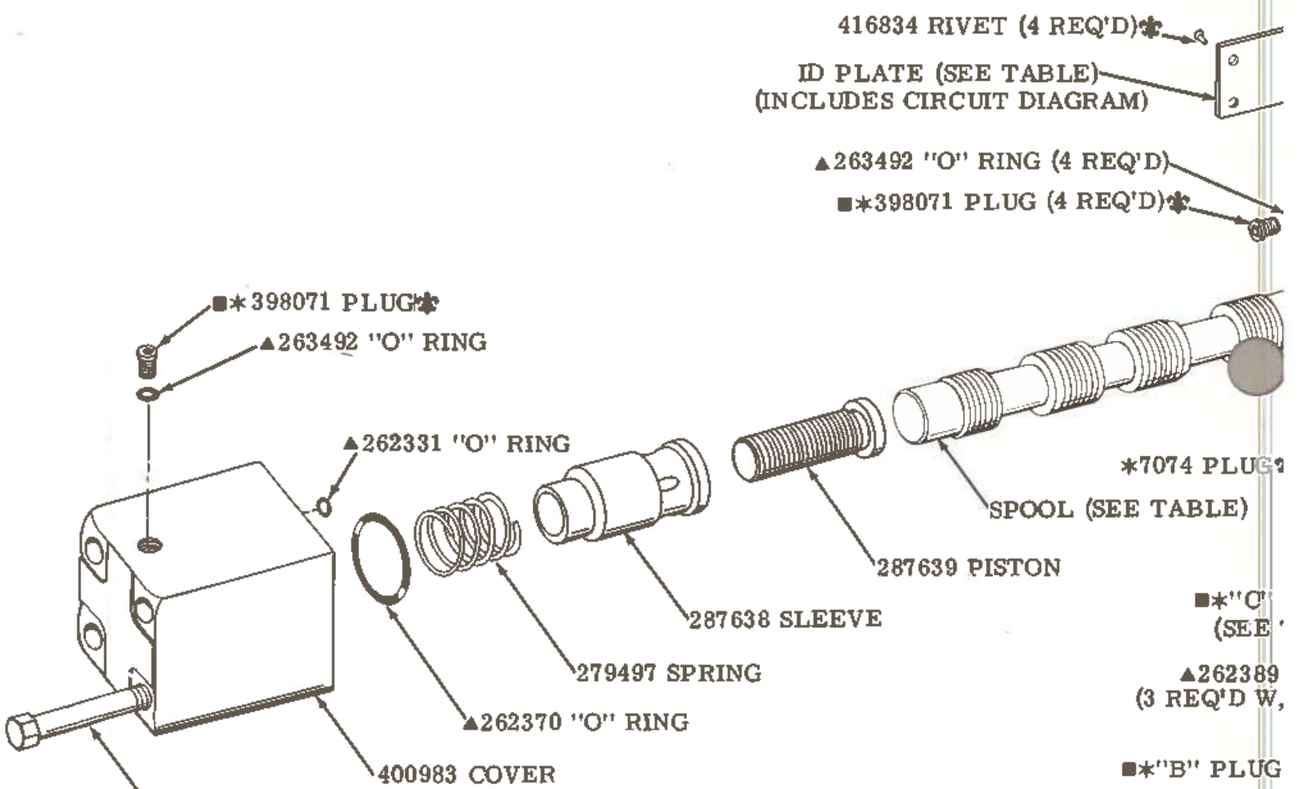
MAIN STAGE VALVE		
MODEL	SPCOL	ID PLATE
DG5S-8-0D	363495	400967
DG5S-8-1D	*276623	400968
DG5S-8-2D	363496	400969
DG5S-8-3D	*276625	400970
DG5S-8-4D	276626	400971
DG5S-8-6D	363498	400972
DG5S-8-8D	363499	400971
DG5S-8-9D	363500	400967
DG5S-8-11D	*276623	573685
DG5S-8-31D	*276625	573685
DG5S-8-33D	363501	400972

PILOT STAGE ATTACHING BOLTS BOLT KIT INCLUDES 4 BOLTS	
MODEL	BOLT KIT
W/OUT PILOT CHOKE	255699
WITH PILOT CHOKE	466838
TORQUE 4.5 - 5.7 N. m (39.8 - 50.4 lb. in.)	
SEE BACK PAGE FOR PILOT CHOKE PARTS BREAKDOWN	

■ PLUG	TORQUES (OILED)	
	N. m	lb. in.
113000 237588	5.0- 5.9	45-52
343740	15.0-16.0	133-142
398071	9.8-10.2	87-90
407533	12.1-12.4	107-110

*NOTE
ASSEMBLE TYPE 1 & 3 SPOOL WITH NARROW CENTER LAND TOWARD "A" END OF VALVE.
ASSEMBLE TYPE 11&31 SPOOL WITH NARRCW CENTER LAND TCWARD "B" END OF VALVE.

▲INCLUDED IN F3 SEAL KIT 920336
∗INCLUDED IN PLUG KIT 941167
◇INCLUDED IN FASTENER KIT 941171
◆NOT AVAILABLE FOR SALE
⊖USED ON CHECK VALVE MODELS ONLY
■PLUG TORQUES (SEE TABLE)
✱AVAILABLE ONLY IN KIT OF 25 EACH



◇470851 SCREW (4 REQ'D)
TORQUE 49-59 N. m
(36-44 lb. ft.)

MODEL	⊖ SPRING	COLOR CODE
-K-	398130	——
-R-	398131	YELLOW
-S-	398132	RED

VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE	SERVICE DWG.
DG5S-8-*D-M-*-*-20	0, 1, 2, 3, 6, 9, 11, 31, 33,	DG4V-3-7C-M-*-*-40	I-3863-S
	4 & 8	DG4V-3-78C-M-*-*-40	

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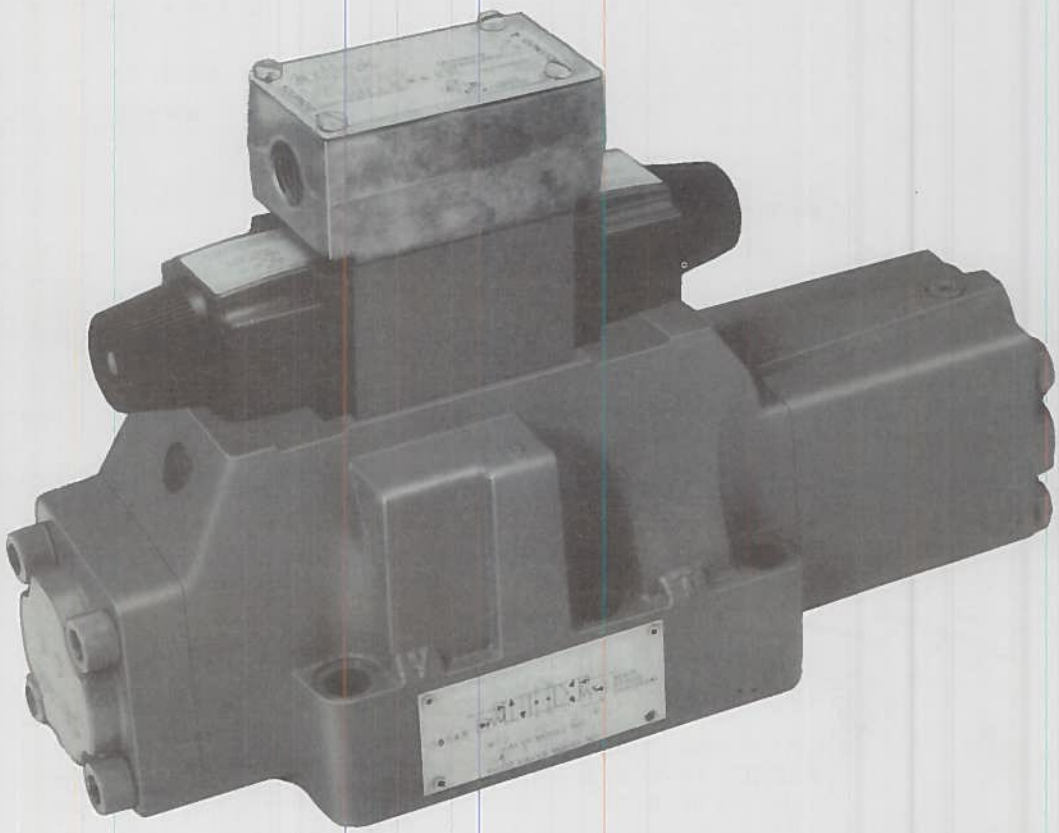
Service Parts Information

Solenoid Controlled Pilot Operated Directional Valves

DG5S-8-*D-(*)-(*)-M-**-*-20



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Released 12-1-86 **I-3873-S**

MODEL CODE BREAKDOWN

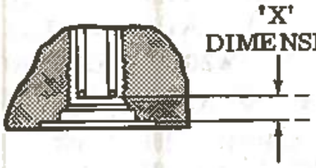
DGV-3-**(2)(L)-40**

- **DG** — DIRECTIONAL CONTROL VALVE
- **M** (manifold) — MANIFOLD OR SUBPLATE MOUNTED
- ****** — MANUAL OPERATION
  - 17 - LEVER
  - 20 - ROLLER CAM
- **V** — RATED PRESSURE 350 BAR (5000 PSI)
- **3** — INTERFACE ISO-4401-03 NFPA-D01
- ****** — SPOOL TYPES 0, 2, 6, 7, & 33
- **(2)** — SPOOL SPRING ARRANGEMENT
  - A - SPRING OFFSET TO NO. 3 POSITION
  - A2 - SPRING OFFSET TO NO. 1 POSITION
  - C - SPRING CENTERED
  - N - NO SPRING DETENTED
- **(L)** — L - LEFT HAND ASSEMBLY LEVER/ROLLER CAM LOCATED ON 'B' END. OMIT FOR STD. RIGHT HAND ASSEMBLY
- **40** — DESIGN

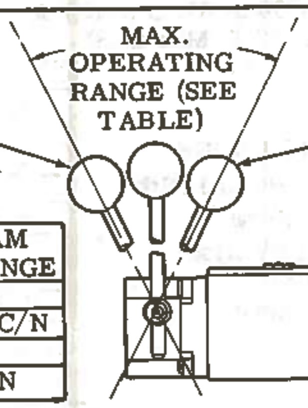
SHIMMING PROCEDURE

If replacement of the spool, detent, or spring is required, perform the following procedure to maintain a nominal detent force of 5kg, (11 lbs), on detented 'N' models only.

1. Turn valve over so porting is up.
2. Install detent and spring into valve cover. Make sure detent is located in a groove of the spool.
3. Measure 'X' distance between top of spring and spot face.
4. Use this measurement to determine shims from table.
5. Install shims and thread plug in place with a torque of 7.4-9.0 N.m (65.0-79.6 lb.in.)



'X' DIMENSION		SHIMS REQ'D
mm	in.	
1.39	.054	0
1.40 -1.70	.055 - .067	1
1.71 -2.00	.068 - .080	2
2.01 -2.30	.081 - .093	3
2.31 -2.60	.094 - .106	4



LEVER/ROLLER CAM MAX. OPERATING RANGE	
RANGE	MODEL
50°	DG17V-3-A/C/N
45°	DG20V-3-A
[illegible]0°	DG20V-3-C/N

✱ AVAILABLE IN LOT KITS (25 PCS.)	
PART #	KIT #
468641	944012
468813	944016
468816	944021
472522	944022
472553	944008
989731	944030
989733	944017
989734	944020
989735	944018
989736	944023

…sfactory service life of these components in industrial applications, use full flow filtration to …uid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, …eries are recommended.

Service Parts Information

LEVER/CAM OPERATED MINIATURE 4-WAY DIRECTIONAL VALVE

DG17V-3-(2)(L)-40 DG20V-3-**(2)(L)-40**

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* NOTE
COLLAR LOCATION SHOWN FOR "A" MODELS AT LEVER POSITION #3. IF LEVER POSITION #1 IS DESIRED, LOCATE COLLAR BEHIND SPRING TO OBTAIN "A2". SEE MODEL CODE.

⊖ ASSEMBLE PILOT SHAFTS FROM THE SIDE OF COVER AS SHOWN.

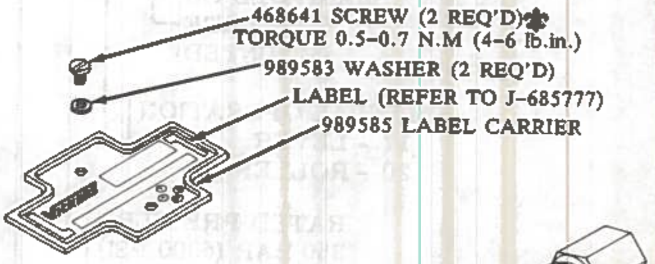
NOTE: ASSEMBLE CENTER LINE OF ROLLER LEVER S/A PARALLEL TO PIVOT SHAFT SLOT.

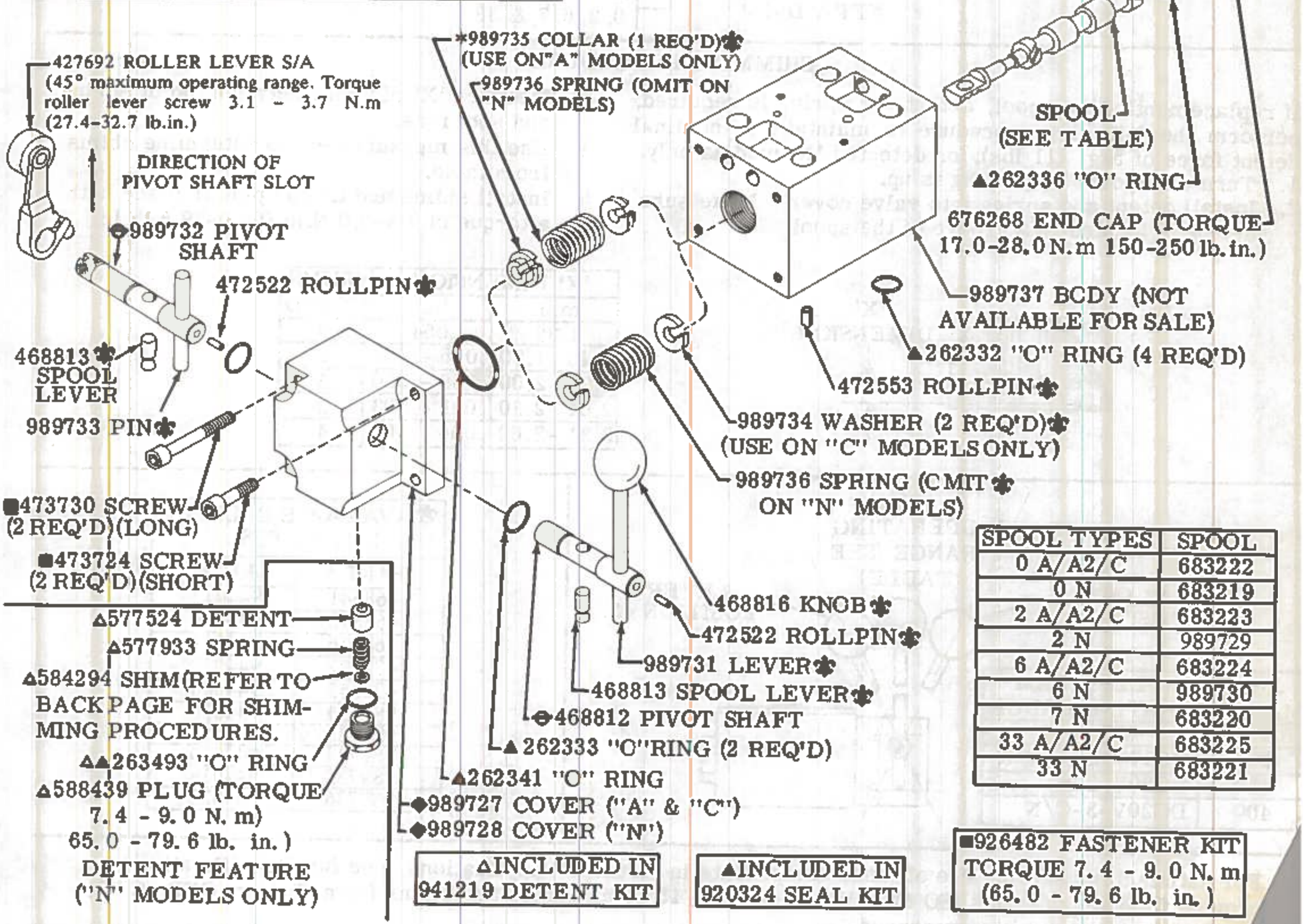
PARTS PREFIXED WITH ▲ △ AND ■ SOLD IN KIT FORM ONLY.

◆ NOT AVAILABLE FOR SALE.

AS THIS COMPLETE UNIT CAN BE REPLACED AT A NOMINAL COST, FACTORY REPAIR IS NOT PRACTICAL. KITS ARE AVAILABLE TO SUPPORT CUSTOMER REPAIR.

RIGHT HAND ASSEMBLY SHOWN. FOR LEFT HAND, ALL PARTS, EXCEPT BODY, ARE REVERSED. CHANGE THE NAMEPLATE LABEL TO REFLECT NEW MODEL CODE.





SPOOL TYPES	SPOOL
0 A/A2/C	683222
0 N	683219
2 A/A2/C	683223
2 N	989729
6 A/A2/C	683224
6 N	989730
7 N	683220
33 A/A2/C	683225
33 N	683221

■926482 FASTENER KIT TORQUE 7.4 - 9.0 N.m (65.0 - 79.6 lb. in.)

△INCLUDED IN 941219 DETENT KIT

▲INCLUDED IN 920324 SEAL KIT

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 12-1-87

MODEL CODE BREAKDOWN

DG3V-3-(L)-40**

- **D** — DIRECTIONAL CONTROL VALVE
- **G** — SUBPLATE OR MANIFOLD MOUNTED
- **3** — OIL PILOT OPERATED
- **V** — RATED PRESSURE 350 bar (5000 PSI)
- **3** — NFPA-D01 INTERFACE (ISO-4401-03)
- ***** — SPOOL TYPE (CENTER CONDITION)
  - 0 - OPEN CENTER (ALL PORTS)
  - 2 - CLOSED CENTER (ALL PORTS)
  - 3 - CLOSED CENTER (P & B PORTS)
  - 6 - CLOSED CENTER (P PORT ONLY)
  - 33 - CLOSED CENTER (BLEED A & B PORT)
- ***** — SPOOL/SPRING ARRANGEMENT
  - BLANK - NO SPRING
  - A - SPRING OFFSET TO PORT A
  - B - SPRING CENTERED, SINGLE OPERATOR
  - C. - SPRING CENTERED
  - F - SPRING OFFSET TO PORT A, SHIFT TO CENTER
  - N - NO SPRING DETENTED
- **(L)**
  - L - LEFT HAND ASSEMBLY (A, B, & F MODELS ONLY)
  - OMIT FOR STD. RIGHT HAND ASSEMBLY
- **40** — DESIGN

AS THIS COMPLETE UNIT CAN BE REPLACED AT A NOMINAL COST, FACTORY REPAIR IS NOT PRACTICAL. KITS ARE AVAILABLE TO SUPPORT CUSTOMER REPAIR.

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

Litho in U. S. A.

Service Parts Information

VICKERS®
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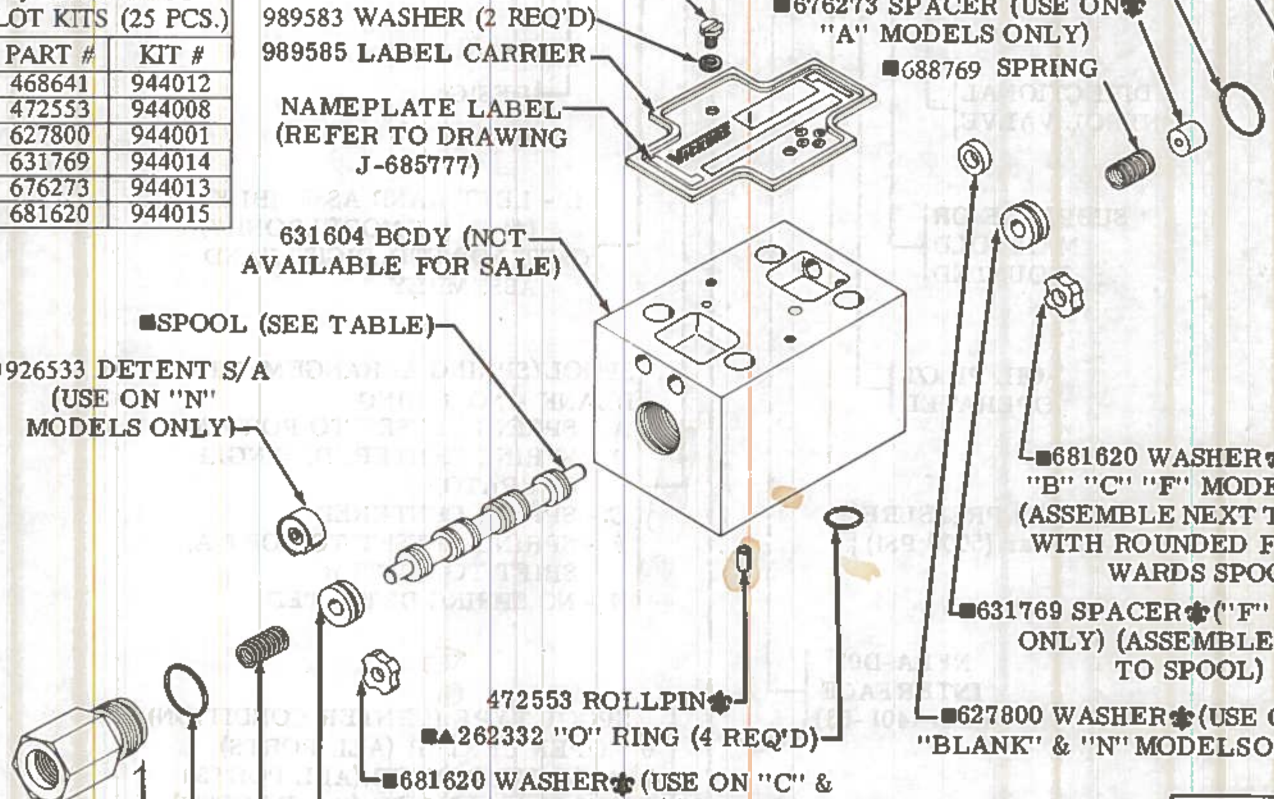
OIL PILOT OPERATED MINIATURE 4-WAY DIRECTIONAL VALVE DG3V-3-**(L)-40

✤ AVAILABLE LOT KITS (25 PCS.)	
PART #	KIT #
468641	944012
472553	944008
627800	944001
631769	944014
676273	944013
681620	944015



▲INCLUDED IN 920332 SEAL KIT

■INCLUDED IN SPOOL KIT (SEE TABLE)

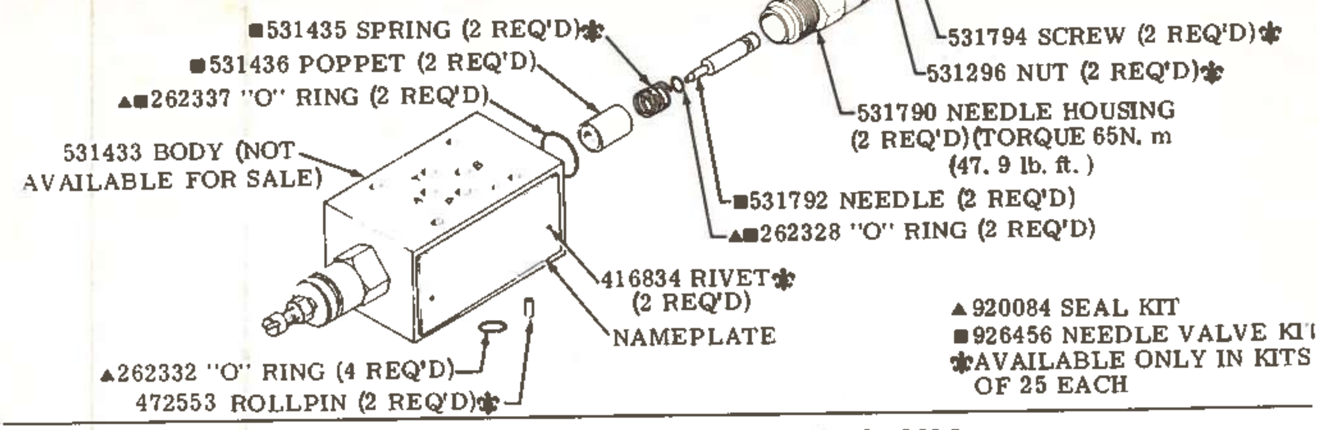
R. H. ASSEMBLY SHOWN, FOR ALL SINGLE OPERATOR MODELS. FOR L. H. ASSEMBLY, ALL PARTS ARE REVERSED EXCEPT BODY FOR "A" MODELS, OR BODY & SPOOL FOR "B" & "F" MODELS

PARTS PREFIXED WITH SYMBOL AVAILABLE ONLY IN KITS.

SPOOL TYPE	SPOOL	SPOOL KIT
OA	689675	926473
OC	587129	926474
2A	681614	926475
2C	587127	926476
2N	681614	926477
3C	590501	926589
6*	681615	926478
6A	681615	926479
6N	587130	926480

ASSEMBLE TYPE 3 SPOOL WITH NARROW CENTER LAND TOWARDS 'A' PORT.

PILOT CHOKE
DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN

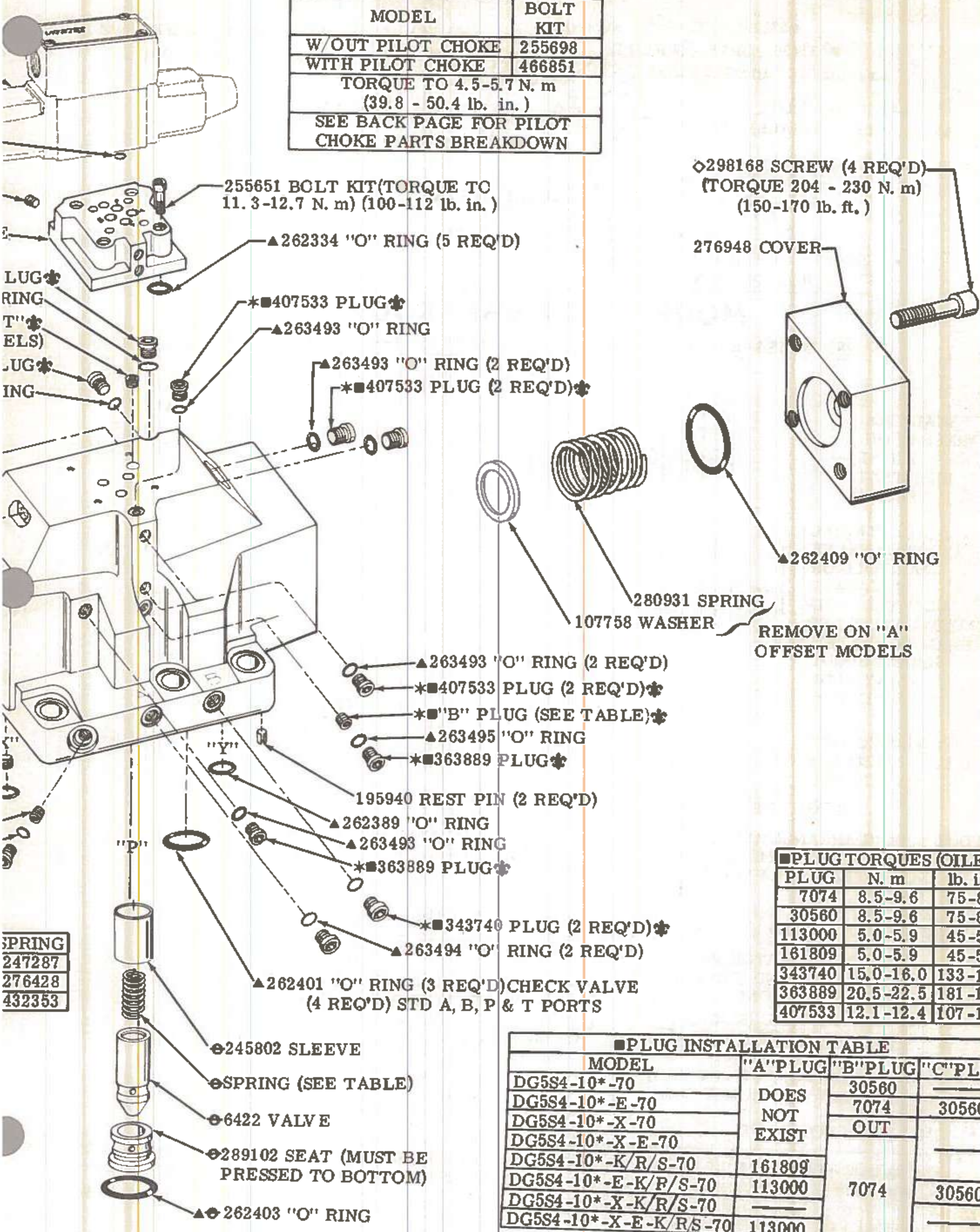
(F3)DG5S4-10(P)(L)(X)-(*)-(E)-(T)(*)-M(P**)-M-**-*-(9)-(**)-70**

- (F3) – SEALS FOR MINERAL OIL & FIRE RESISTANT FLUIDS
- DG5S4 – DIRECTIONAL CONTROL VALVE MANIFOLD OR SUBPLATE MOUNTED. SOLENOID CONTROLLED, PILOT OPERATED, SLIDING SPOOL, 4 WAY FLOW DIRECTION
- 10 – VALVE SIZE 1-1/4" NFPA-D10 (ISO-4401-10) INTERFACE
- ** – SPOOL TYPES
- SPOOL SPRING ARRANGEMENT
  - A - SPRING OFFSET TO CYL. A
  - B - SPRING CENTERED SOLENOID A REMOVED
  - C - SPRING CENTERED
  - N - NO SPRING DETENTED
- (P) – MANUAL OPERATOR IN PILOT VALVE END CAP. A & B MODELS ONLY *
- (L) – LEFT HAND (SINGLE SOLENOID ONLY) *
- (X) – X - FAST RESPONSE (OMIT FOR STD. LOW SHOCK MODELS)
- (*) – SPOOL CONTROL MODIFICATIONS *
  - 1 - STROKE ADJUSTMENT
  - 2 - PILOT CHOKE ADJUSTMENT
  - 3 - PILOT CHOKE & STROKE ADJ.
  - 7 - STROKE ADJ. CYL. "A" ONLY
  - 8 - STROKE ADJ. CYL. "B" ONLY
  - 2-7 - DUAL PILOT CHOKE & STROKE ADJ. "A" PORT END ONLY.
  - 2-8 - DUAL PILOT CHOKE & STROKE ADJ. "B" PORT END ONLY.
- (E) – E - EXTERNAL PILOT PRESSURE *
- (T) – T - INTERNAL PILOT DRAIN *
- (*) – CHECK VALVE IN PRESSURE PORT *
  - K-0.35 bar (5 PSI CRACKING PRESS.)
  - R-3.45 bar (50 PSI CRACKING PRESS.)
  - S-5.20 bar (75 PSI CRACKING PRESS.)
- M – FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS
- (P**) – ELECTRICAL FEATURES REFER TO I-3866-S FOR DETAILED INFORMATION
- M – DG4V-3 PILOT VALVE & ADAPTER PLATE
- **
  - U-DIN 43650
  - W - WIRING HSG. ½ NTP. THD.
  - WL - WIRING HSG. ½ NPT. THD. (WITH INDICATOR LIGHT)
- * – COIL IDENTIFICATION LETTER
- (9) – LOW WATTAGE B COIL *
- (**) – PILOT VALVE PORT ORIFICE *
- 70 – DESIGN

* - OMIT WHEN NOT REQ'D

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

PILOT STAGE ATTACHING BOLTS BOLT KIT INCLUDES 4 BOLTS	
MODEL	BOLT KIT
W/OUT PILOT CHOKE	255698
WITH PILOT CHOKE	466851
TORQUE TO 4.5-5.7 N. m (39.8 - 50.4 lb. in.)	
SEE BACK PAGE FOR PILOT CHOKE PARTS BREAKDOWN	



SPRING
247287
276428
432353

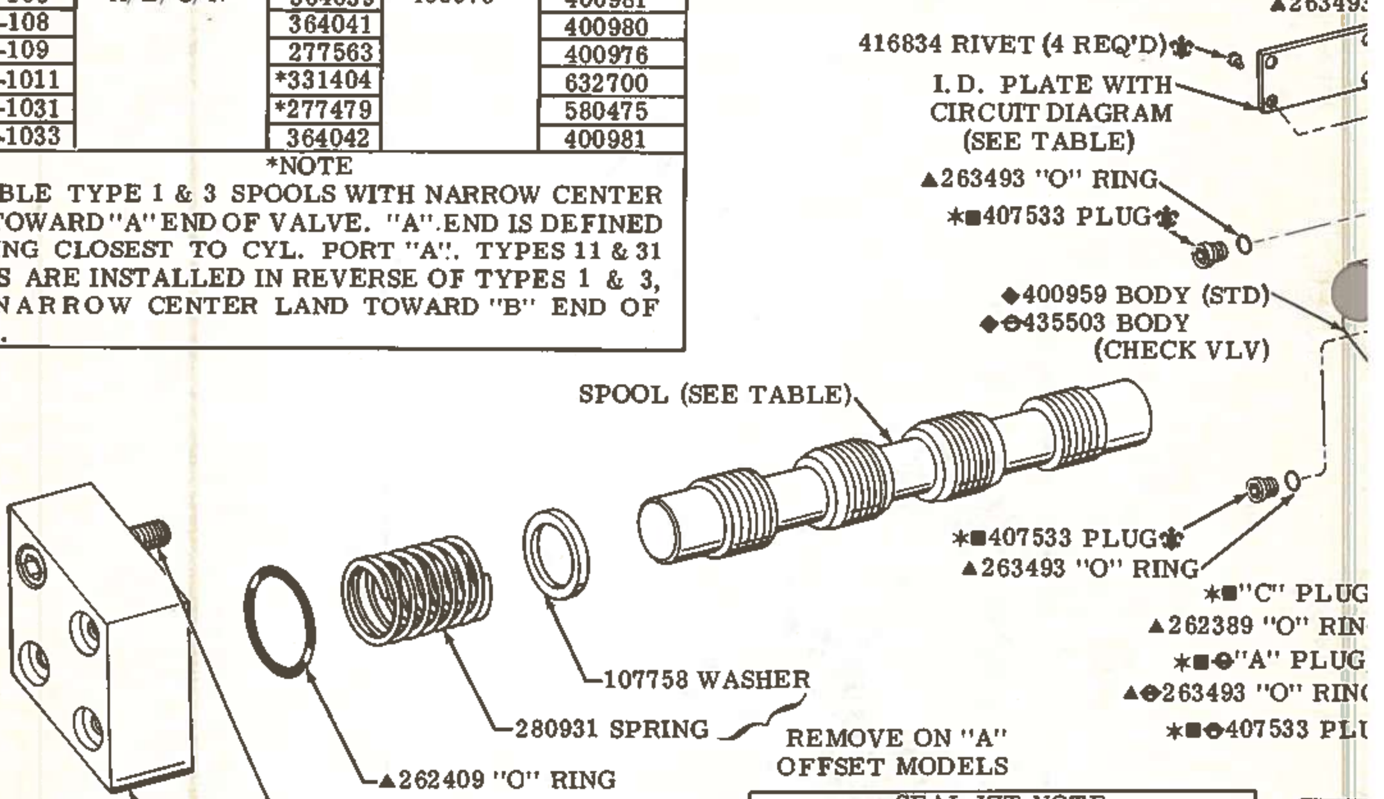
■PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
7074	8.5-9.6	75-85
30560	8.5-9.6	75-85
113000	5.0-5.9	45-52
161809	5.0-5.9	45-52
343740	15.0-16.0	133-147
363889	20.5-22.5	181-199
407533	12.1-12.4	107-110

■PLUG INSTALLATION TABLE			
MODEL	"A"PLUG	"B"PLUG	"C"PLUG
DG5S4-10*-70	DOES NOT EXIST	30560	—
DG5S4-10*-E-70		7074	30560
DG5S4-10*-X-70		OUT	
DG5S4-10*-X-E-70			—
DG5S4-10*-K/R/S-70	161809		
DG5S4-10*-E-K/R/S-70	113000	7074	
DG5S4-10*-X-K/R/S-70	—		30560
DG5S4-10*-X-E-K/R/S-70	113000		—

VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE	SERVICE DWG.
DG5S4-10*A-M-(*)-M-*-70	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-2A-M-*-*-40	I-3861-S
	4 & 8	DG4V-3-28A-M-*-*-40	
DG5S4-10*B-M-(*)-M-*-70	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6B-M-*-*-40	I-3862-S
	4 & 8	DG4V-3-68B-M-*-*-40	
DG5S4-10*C-M-(*)-M-*-70	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6C-M-*-*-40	I-3863-S
	4 & 8	DG4V-3-68C-M-*-*-40	
DG5S4-10*N-M-(*)-M-*-70	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6N-M-*-*-40	I-3865-S
	4 & 8	DG4V-3-68N-M-*-*-40	

MAIN STAGE SPOOL	AVAILABLE VALVE TYPE	SPOOL	MAIN STAGE ID PLATE	
			A ONLY	B/C/N
DG5S4-100	A/B/C/N	364037	400975	400976
DG5S4-101		*331404		400977
DG5S4-102		364038		400978
DG5S4-103		*277479		400979
DG5S4-104		281193		400980
DG5S4-106		364039		400981
DG5S4-108		364041		400980
DG5S4-109		277563		400976
DG5S4-1011		*331404		632700
DG5S4-1031		*277479		580475
DG5S4-1033		364042		400981

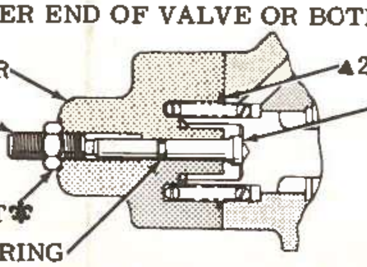
*NOTE
ASSEMBLE TYPE 1 & 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END IS DEFINED AS BEING CLOSEST TO CYL. PORT "A". TYPES 11 & 31 SPOOLS ARE INSTALLED IN REVERSE OF TYPES 1 & 3, WITH NARROW CENTER LAND TOWARD "B" END OF VALVE.



SEAL KIT NOTE
Valves are manufactured with F3 seals used internally. Interface seals are std Nitrile material and are converted to F3 in seal kit. All seal kit seals are F3.

MOD
-K-M
-R-M
-S-M

STROKE ADJUSTMENT PARTS
(EITHER END OF VALVE OR BOTH ENDS)



▲INCLUDED IN F3 SEAL KIT 920315
*INCLUDED IN PLUG KIT 941263
◇INCLUDED IN FASTENER KIT 941262
⊖USED ON CHECK VALVE MODELS ONLY
■PLUG TORQUES (SEE TABLE)
◆NOT AVAILABLE FOR SALE
✤AVAILABLE ONLY IN KIT OF 25 EACH

- SAE STRAIGHT THREAD PLUGS USED ON EXTERIOR OF VALVE
- PARTS INCLUDED IN SERVICE KITS NOT SOLD SEPARATELY

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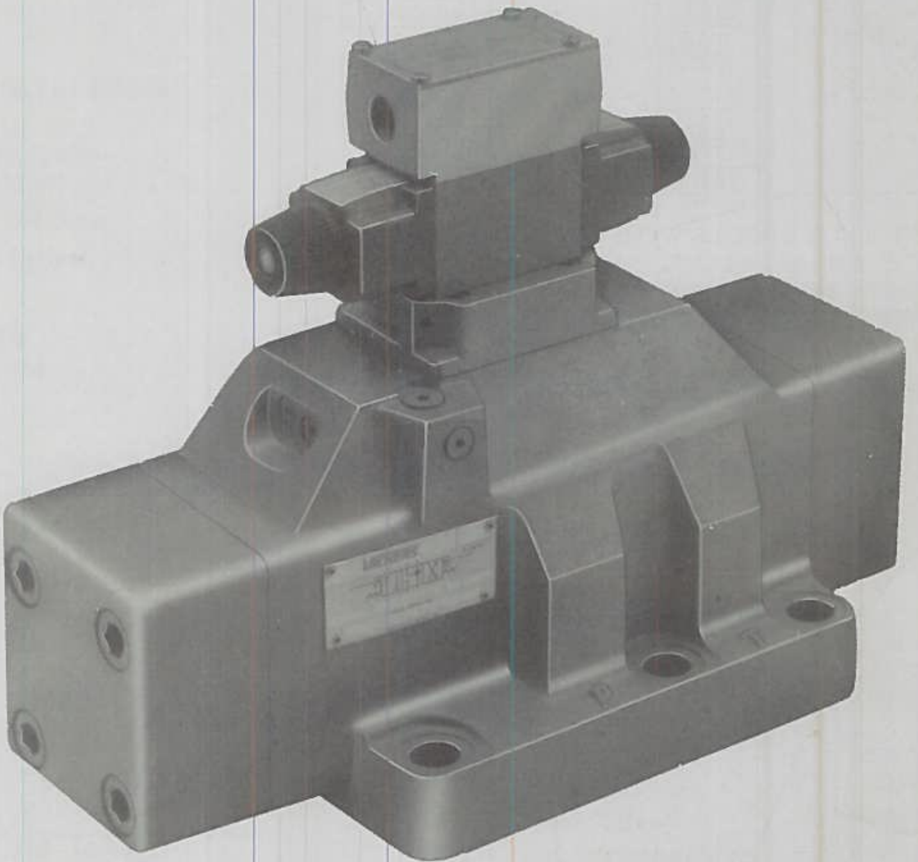
Service Parts Information

Solenoid Controlled Pilot Operated Directional Valves

DG5S4-10-**-*-*-M-*-*-M-**-*-70



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 12-1-87

I-3870-S

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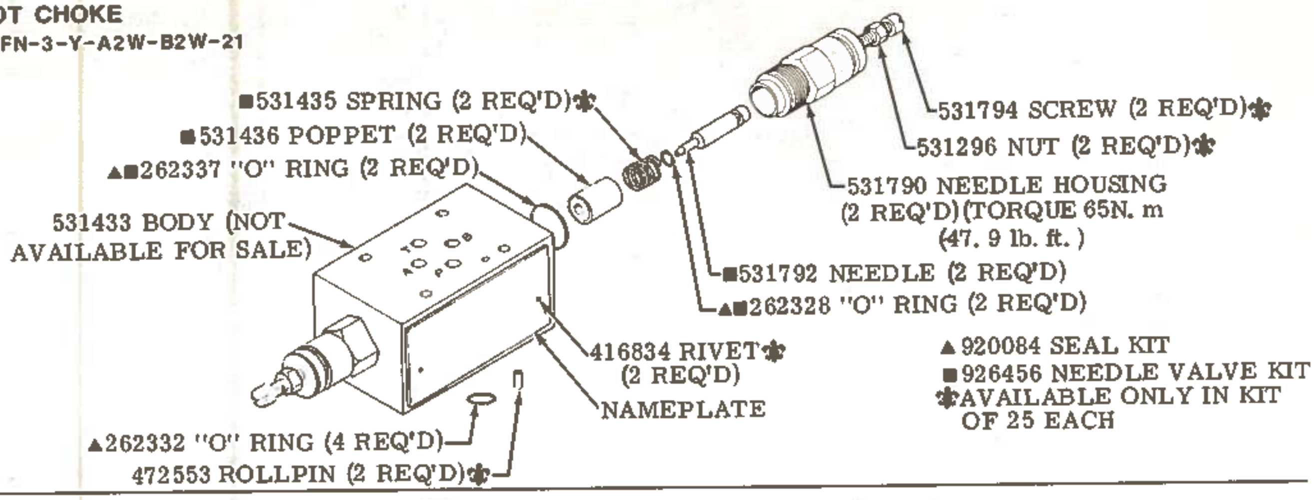
PILOT CHOKE
DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN

(F3)DG5S-8-(P)(L)(X)-(*)-(E)-(T)(*)-M(P**)-**-*-(9)-(**)-20**

- **(F3)** – SEALS FOR MINERAL OIL & FIRE RESISTANT FLUIDS
- **DG5S** – DIRECTIONAL CONTROL VALVE MANIFOLD OR SUBPLATE MOUNTED. SOLENOID CONTROLLED PILOT OPERATED.RATED PRESS. 210 bar (3000 PSI)
- **8** – INTERFACE NFPA-D06 (ISO-4401-08)
- ****** – SPOOL TYPES
- SPOOL SPRING ARRANGEMENT
  - A - SPRING OFFSET TO CYL. A
  - B - SPRING CENTERED SOLENOID A REMOVED.
  - C - SPRING CENTERED
  - F - SPRING OFFSET TO CYL. A SHIFT TO CENTER
  - N - NO SPRING DETENTED
- **(P)** – MANUAL OPERATOR IN PILOT VALVE END CAP. A, B & F MODELS ONLY *
- **(L)** – LEFT HAND (SINGLE SOLENOID ONLY) *
- **(X)** – X - FAST RESPONSE (OMIT FOR STD. LOW SHOCK MODELS)
- **(*)** – SPOOL CONTROL MODIFICATIONS *
  - 1 - STROKE ADJUSTMENT
  - 2 - PILOT CHOKE ADJUSTMENT
  - 3 - PILOT CHOKE & STROKE ADJ.
  - 7 - STROKE ADJ. CYL. "A" ONLY
  - 8 - STROKE ADJ. CYL. "B" ONLY
  - 2-7 - DUAL PILOT CHOKE & STROKE ADJ. "A" PORT END ONLY.
  - 2-8 - DUAL PILOT CHOKE & STROKE ADJ. "B" PORT END ONLY.
- **(E)** – E - EXTERNAL PILOT PRESSURE *
- **(T)** – T - INTERNAL PILOT DRAIN *
- **(*)** – CHECK VALVE IN PRESSURE PORT *
  - K - 0.35 bar (5 PSI CRACKING PRESS.)
  - R - 3.45 bar (50 PSI CRACKING PRESS.)
  - S - 5.20 bar (75 PSI CRACKING PRESS.)
- **M** – FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS
- **(P**)** – ELECTRICAL FEATURES REFER TO I-3866-S FOR DETAILED INFORMATION
- ****** –
  - U - DIN 43650
  - W - WIRING HSG. ½NPT. THD.
  - WL - WIRING HSG. ½NPT. THD. (WITH INDICATOR LIGHT)
- ***** – COIL IDENTIFICATION LETTER
- **(9)** – LOW WATTAGE B COIL *
- **(**)** – PILOT VALVE PORT ORIFICE *
- **20** – DESIGN

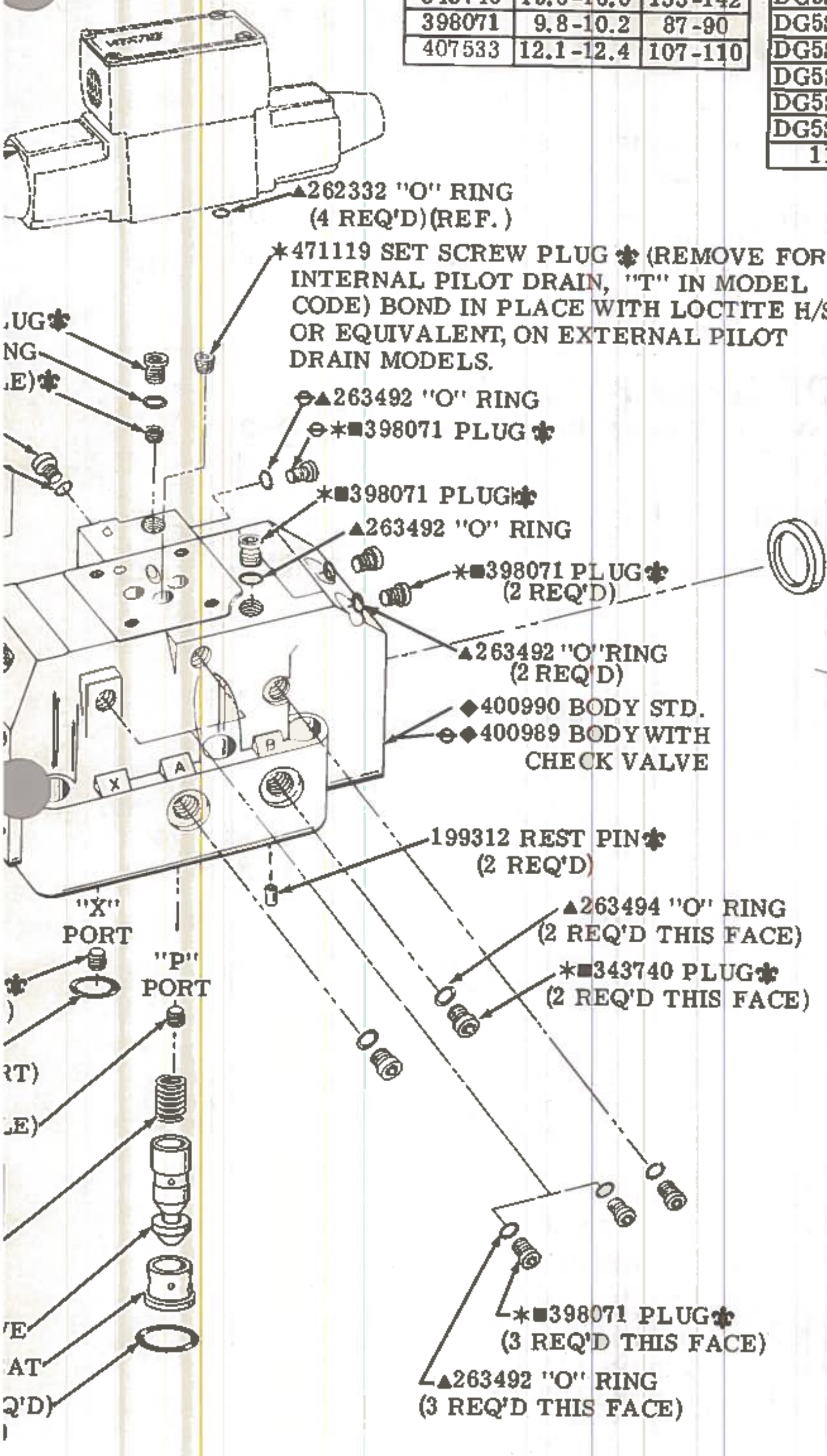
* OMIT WHEN NOT REQ'D

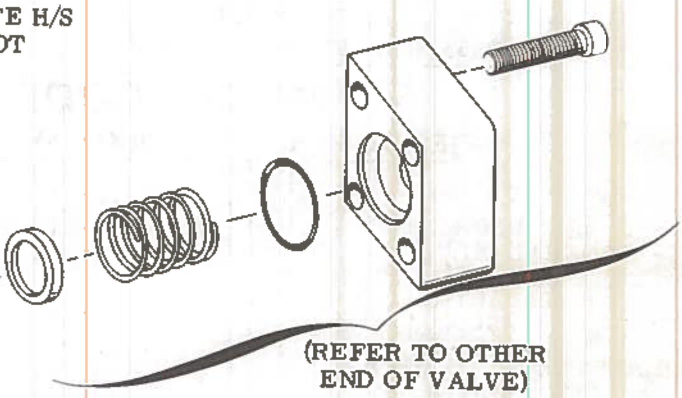
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

■PLUG	TORQUES (OILED)	
	N. m	lb. in.
113000	5.0 - 5.9	45-52
237588	5.0 - 5.9	45-52
343740	15.0-16.0	133-142
398071	9.8-10.2	87-90
407533	12.1-12.4	107-110

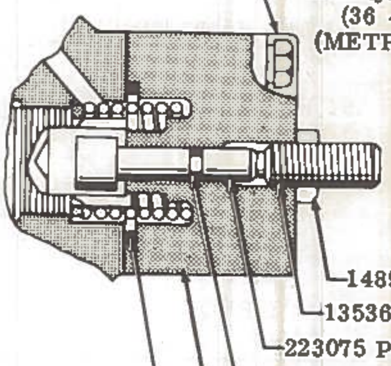
■PLUG INSTALLATION TABLE			
MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S-8-**-20	DOES NOT EXIST	237588	——
DG5S-8-**-E-20		113000	237588
DG5S-8-**X-20		——	——
DG5S-8-**X-E-20		113000	
DG5S-8-**-KRS-20	237588	DOES NOT EXIST	237588
DG5S-8-**-E-KRS-20	113000		
DG5S-8-**X-KRS-20	——		——
DG5S-8-**X-E-KRS-20	113000		
113000 SOLID PLUG	237588 ORIFICE PLUG		





- PARTS PREFIXED WITH SYMBOL AVAILABLE ONLY IN KITS.
- ALL THREADED FASTENERS ARE METRIC.
- END COVER SCREWS ARE METRIC GRADE 12. 9.

PARTS SHOWN INCLUDED IN STROKE ADJ. KIT 941154. ORDER TWO KITS IF STROKE ADJ. IS REQ'D BOTH ENDS.

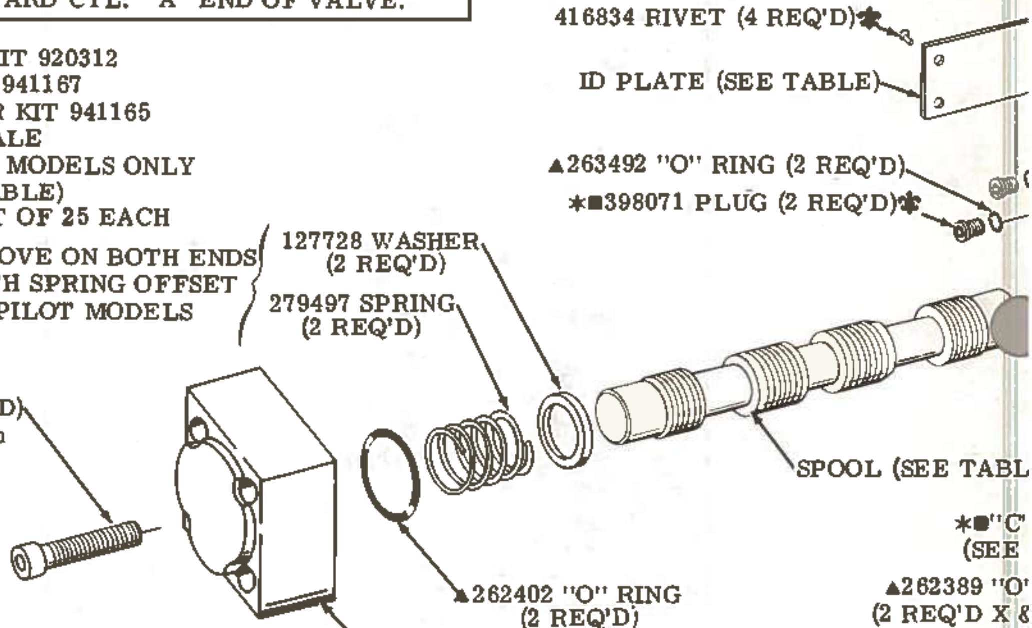


MAIN STAGE SPOOL	AVAILABLE VALVE TYPE	SPOOL	MAIN STAGE ID PLATE "A" ONLY	MAIN STAGE ID PLATE B/C/F/N
DG5S-8-0	A/B/C/F/N	363495	400975	400976
DG5S-8-1		*276623		400977
DG5S-8-2		363496		400978
DG5S-8-3		*276625		400979
DG5S-8-4		276626		400980
DG5S-8-6		363498		400981
DG5S-8-8		363499		400980
DG5S-8-9		363500		400976
DG5S-8-11		*276623		632700
DG5S-8-31		*276625		580475
DG5S-8-33		363501		400981
DG5S-8-52/521	C	*420583	——	573685

*NOTE
ASSEMBLE TYPE 1 & 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END IS DEFINED AS BEING CLOSEST TO CYL. PORT "A". TYPE 11 & 31 SPOOLS ARE INSTALLED IN REVERSE OF TYPE 1 & 3 WITH NARROW CENTER LANDS TOWARD "B" END OF VALVE. ASSEMBLE TYPE 52 SPOOL WITH TWO NARROW CENTER LANDS TOWARD CYL."B" END OF VALVE. ASSEMBLE TYPE 521 SPOOL WITH TWO NARROW CENTER LANDS TOWARD CYL. "A" END OF VALVE.

PILOT STAGE ATTACHING BOLTS BOLT KIT INCLUDES 4 BOLTS	
MODEL	BOLT KIT
W/OUT PILOT CHOKE	255699
W/PILOT CHOKE	466838
TORQUE TO 4.5-5.7 N. m (39. 8 - 50. 4 lb. in.)	
SEE BACK PAGE FOR PILOT CHOKE PARTS BREAKDOWN	

▲INCLUDED IN F3 SEAL KIT 920312
✱INCLUDED IN PLUG KIT 941167
□INCLUDED IN FASTENER KIT 941165
◆NOT AVAILABLE FOR SALE
⊖USED ON CHECK VALVE MODELS ONLY
■PLUG TORQUES (SEE TABLE)
✤AVAILABLE ONLY IN KIT OF 25 EACH



MODEL	⊖ SPRING	C
DG5S-8-***-K-*-20	398130	-
DG5S-8-***-R-*-20	398131	YE
DG5S-8-***-S-*-20	398132	

⊖58044
⊖58
▲262394 "O" RIN
(A, B, P & T

VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE	SERVICE DWG.
DG5S-8-*A-M-*-*-20	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-2A-M-*-*-40	I-3861-S
	4 & 8	DG4V-3-28A-M-*-*-40	
DG5S-8-*B-M-*-*-20	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6B-M-*-*-40	I-3862-S
	4 & 8	DG4V-3-68B-M-*-*-40	
DG5S-8-*C-M-*-*-20	0, 1, 2, 3, 6, 9, 11, 31, 33, 52, 521	DG4V-3-6C-M-*-*-40	I-3863-S
	4 & 8	DG4V-3-68C-M-*-*-40	
DG5S-8-*F-M-*-*-20	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6F-M-*-*-40	I-3864-S
	4 & 8	DG4V-3-68F-M-*-*-40	
DG5S-8-*N-M-*-*-20	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6N-M-*-*-40	I-3865-S
	4 & 8	DG4V-3-68N-M-*-*-40	

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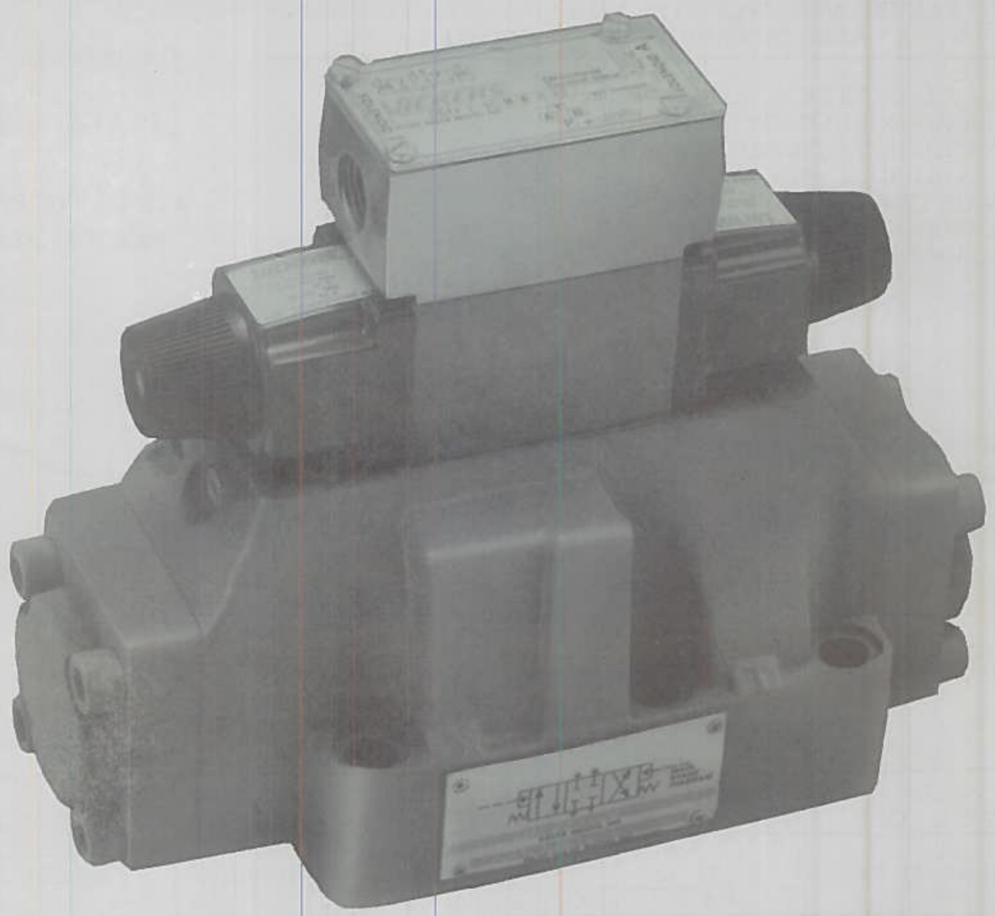
Service Parts Information

Solenoid Controlled Pilot Operated Directional Valves

DG5S-8-**-(*)-(*)-M-**-*-20



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007–0302

Released 5-1-86

I-3869-S

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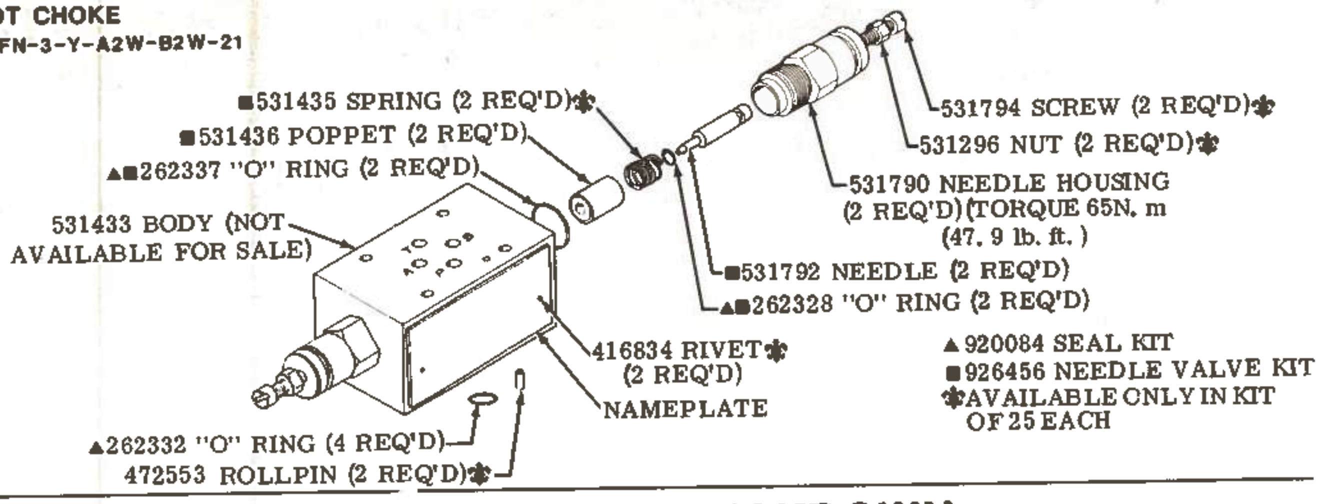
PILOT CHOKE
DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN

(F3)DG5S-H8-(P)(L)(X)-(*)-(E)-(T)(*)-M(P**)-**-*-(9)-(**)-50**

- SEALS FOR MINERAL OIL & FIRE RESISTANT FLUIDS
- DIRECTIONAL CONTROL VALVE MANIFOLD OR SUBPLATE MOUNTED. SOLENOID CONTROLLED PILOT OPERATED. RATED PRESS. 210 bar (3000 PSI)
- HIGH FLOW INTERFACE NFPA-D06 (ISO-4401-08)
- SPOOL TYPES
- SPOOL SPRING ARRANGEMENT
  - A - SPRING OFFSET TO CYL. A
  - B - SPRING CENTERED SOLENOID A REMOVED.
  - C - SPRING CENTERED
  - N - NO SPRING DETENTED
- MANUAL OPERATOR IN PILOT VALVE END CAP. A & B MODELS ONLY *
- LEFT HAND (SINGLE SOLENOID ONLY) *
- X - FAST RESPONSE (OMIT FOR STD. LOW SHOCK MODELS)
- SPOOL CONTROL MODIFICATIONS*
  - 1 - STROKE ADJUSTMENT
  - 2 - PILOT CHOKE ADJUSTMENT
  - 3 - PILOT CHOKE & STROKE ADJ.
  - 7 - STROKE ADJ. CYL. "A" ONLY
  - 8 - STROKE ADJ. CYL. "B" ONLY
  - 2-7 - DUAL PILOT CHOKE & STROKE ADJ. "A" PORT END ONLY.
  - 2-8 - DUAL PILOT CHOKE & STROKE ADJ. "B" PORT END ONLY.
- E - EXTERNAL PILOT PRESSURE *
- T - INTERNAL PILOT DRAIN *
- CHECK VALVE IN PRESSURE PORT *
  - K - 0.35 bar (5 PSI CRACKING PRESS.)
  - R - 3.45 bar (50 PSI CRACKING PRESS.)
  - S - 5.20 bar (75 PSI CRACKING PRESS.)
- FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS.
- ELECTRICAL FEATURES REFER TO I-3866-S FOR DETAILED INFORMATION
- U - DIN 43650
  - W - WIRING HSG. ½NPT. THD.
  - WL - WIRING HSG. ½NPT. THD. (WITH INDICATOR LIGHT)
- COIL IDENTIFICATION LETTER
- LOW WATTAGE B COIL *
- PILOT VALVE PORT ORIFICE*
- DESIGN

* OMIT WHEN NOT REQ'D

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

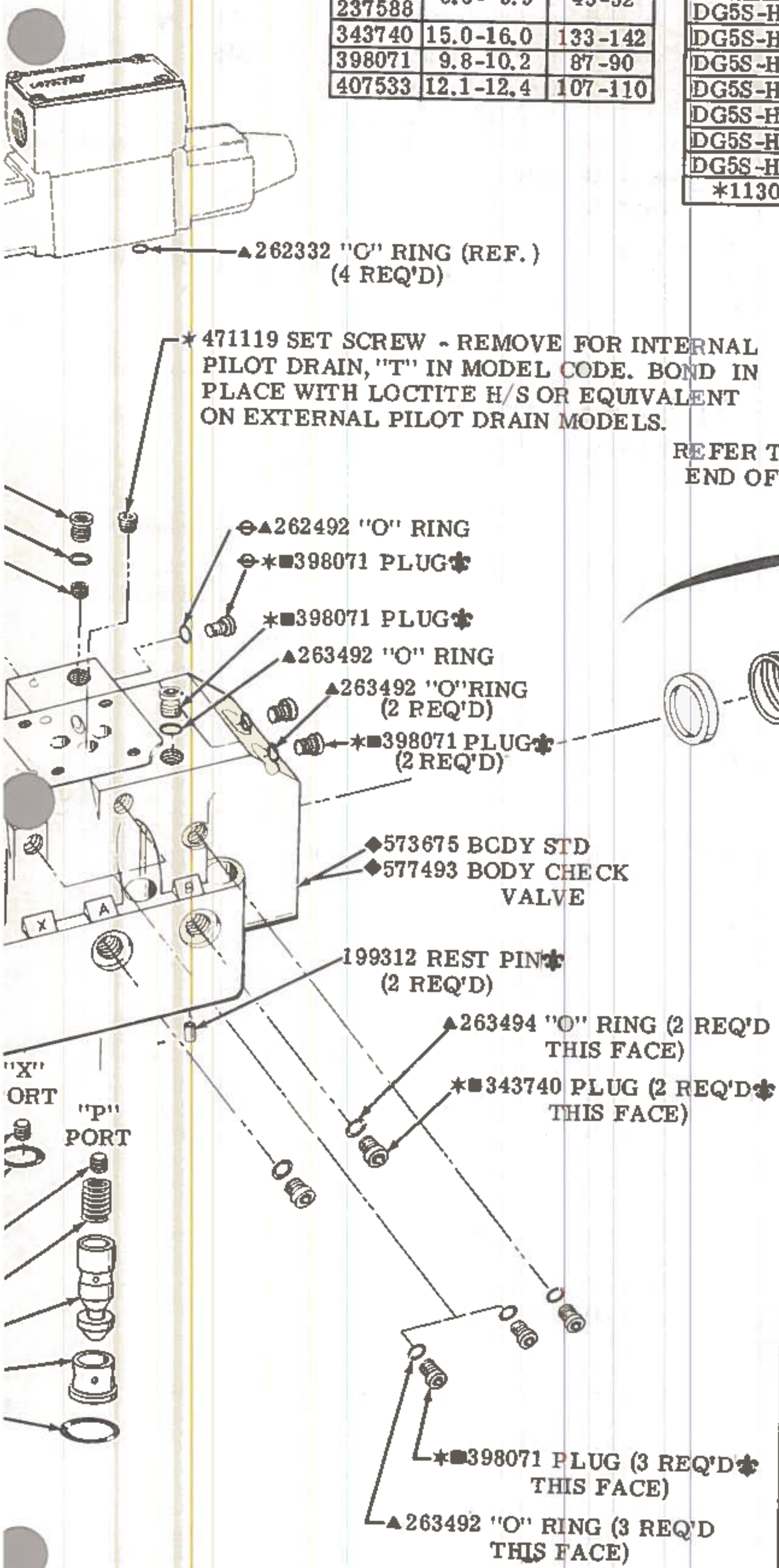
Litho in U. S. A.

■ PLUG	TORQUES (OILED) N. m	TORQUES (OILED) lb. in.
113000	5.0- 5.9	45-52
237588		
343740	15.0-16.0	133-142
398071	9.8-10.2	87-90
407533	12.1-12.4	107-110

■ PLUG INSTALLATION TABLE

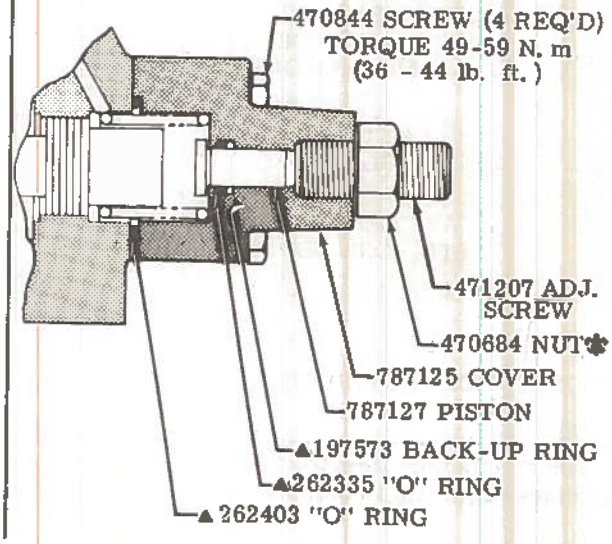
MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S-H8-**-50	DOES NOT EXIST	237588	——
DG5S-H8-**-E-50		113000	237588
DG5S-H8-**-X-50		OUT	
DG5S-H8-**-X-E-50		113000	——
DG5S-H8-**-KRS-50	237588	DOES NOT EXIST	
DG5S-H8-**-E-KRS-50	113000		237588
DG5S-H8-**-X-KRS-50	——		
DG5S-H8-**-X-E-KRS-50	113000		——

*113000 SOLID PLUG *237588 ORIFICE PLUG



- PARTS PREFIXED WITH SYMBOL AVAILABLE ONLY IN KITS
- ALL THREADED FASTENERS ARE METRIC.
- END COVER SCREWS ARE METRIC GRADE 12. 9.

PARTS SHOWN INCLUDED IN 941156 STROKE ADJUSTMENT KIT. ORDER 2 KITS IF STROKE ADJUSTMENT IS REQUIRED FOR BOTH ENDS.



MAIN STAGE SPOOL	AVAILABLE VALVE TYPE	SPOOL	MAIN STAGE ID PLATE A ONLY	MAIN STAGE ID PLATE B/C/N
DG5S-H8-0	A/B/C/N	786350	400975	400976
DG5S-H8-1		*786557		400977
DG5S-H8-2		786349		400978
DG5S-H8-3		*786558		400979
DG5S-H8-4		628162		400980
DG5S-H8-6		786559		400981
DG5S-H8-8		627221		400980
DG5S-H8-9		786561		400976
DG5S-H8-11		*786557		632700
DG5S-H8-31		*786558		580475
DG5S-H8-33		786562		400981

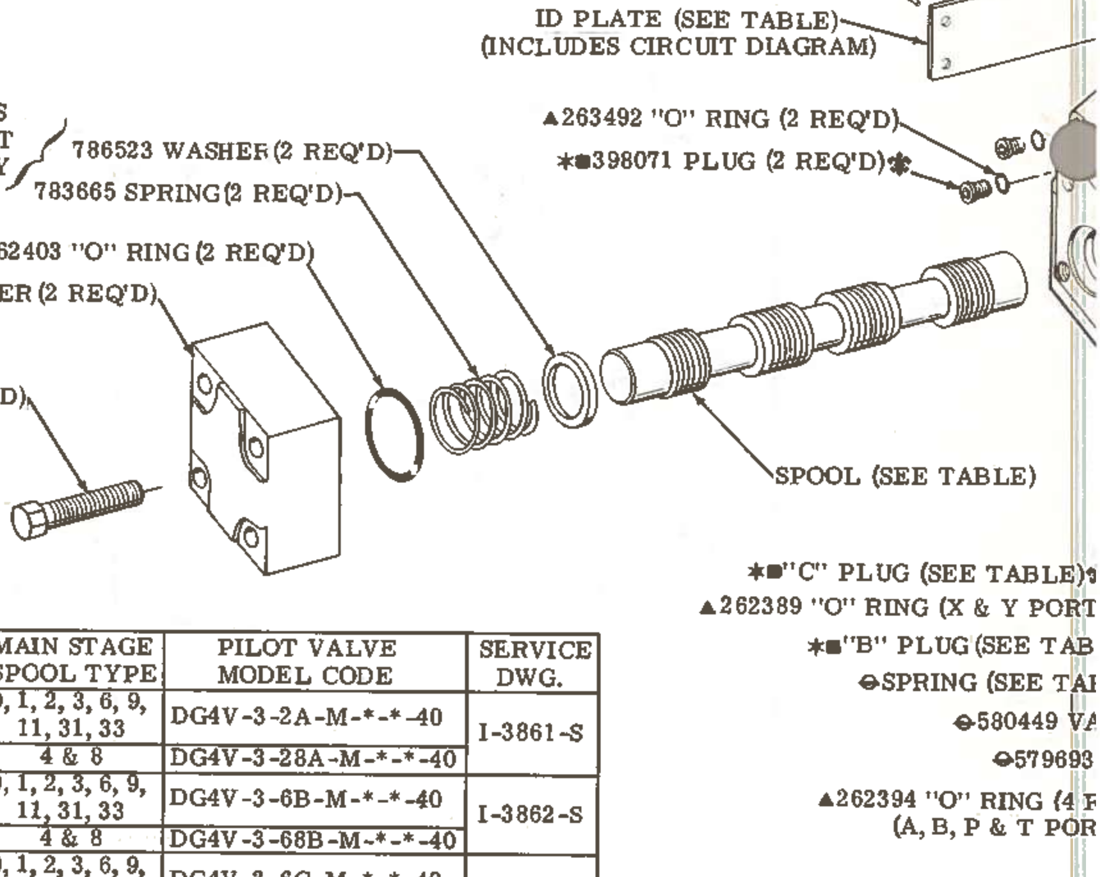
*NOTE

ASSEMBLE TYPE 1 & 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END IS DEFINED AS BEING CLOSEST TO CYL. PORT "A". TYPES 11 & 31 SPOOLS ARE INSTALLED IN REVERSE OF TYPES 1 & 3, WITH NARROW CENTER LAND TOWARD "B" END OF VALVE.

PILOT STAGE ATTACHING BOLTS BOLT KIT INCLUDES 4 BOLTS	
MODEL	BOLT KIT
W/OUT PILOT CHOKE	255699
WITH PILOT CHOKE	466838
TORQUE TO 4.5-5.7 N. m (39.8 - 50.4 lb. in.)	
SEE BACK PAGE FOR PILOT CHOKE PARTS BREAKDOWN	

THIS SOLENOID REMOVED ON R. H. "A" AND "B" MODELS. REFER TO SERVICE DWGS FOR L. H. MODELS.

▲INCLUDED IN F3 SEAL KIT 920311
✱INCLUDED IN PLUG KIT 941167
◇INCLUDED IN FASTENER KIT 941175
◆NOT AVAILABLE FOR SALE
⊖USED ON CHECK VALVE MODELS ONLY
■PLUG TORQUES (SEE TABLE)
✽AVAILABLE ONLY IN KIT OF 25 EACH



VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE	SERVICE DWG.
DG5S-H8-*A-M-*-*-50	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-2A-M-*-*-40	I-3861-S
	4 & 8	DG4V-3-28A-M-*-*-40	
DG5S-H8-*B-M-*-*-50	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6B-M-*-*-40	I-3862-S
	4 & 8	DG4V-3-68B-M-*-*-40	
DG5S-H8-*C-M-*-*-50	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6C-M-*-*-40	I-3863-S
	4 & 8	DG4V-3-68C-M-*-*-40	
DG5S-H8-*N-M-*-*-50	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6N-M-*-*-40	I-3865-S
	4 & 8	DG4V-3-68N-M-*-*-40	

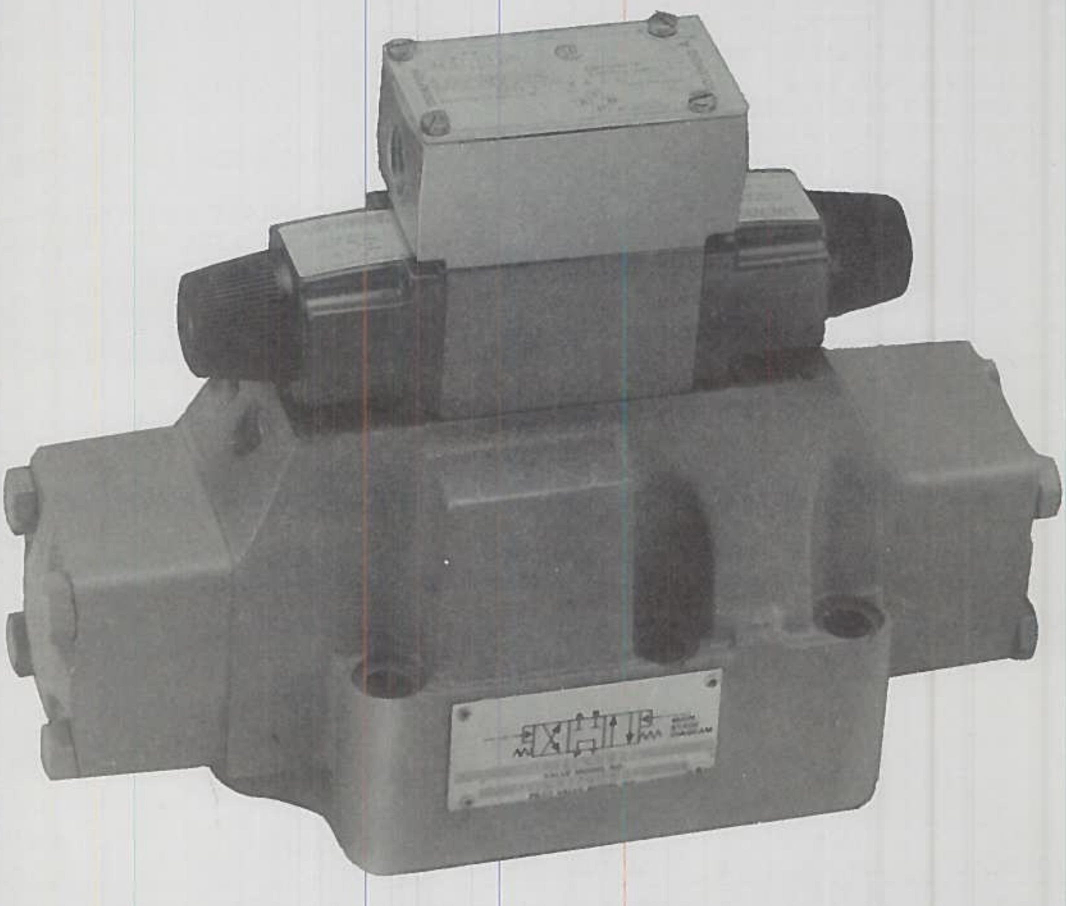
MODEL	⊖ SPRING	COLOR CODE
-K-	398130	——
-R-	398131	YELLOW
-S-	398132	RED

VICKERS®
A TRINOVA COMPANY

Service Parts Information

Solenoid Controlled
Pilot Operated
Directional Valves

DG5S-H8-**-*-*-M-**-*-50

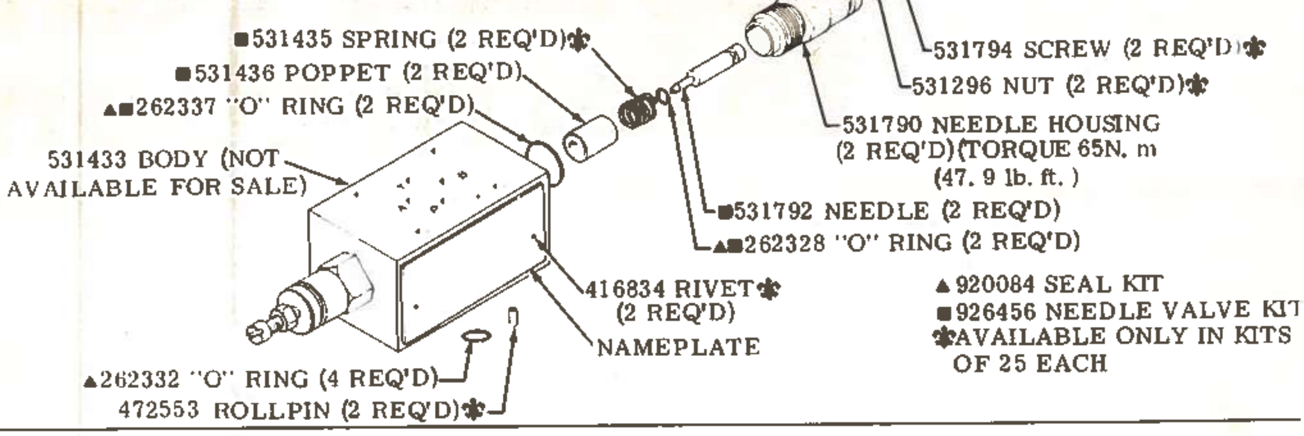


Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007–0302

Released 5-1-86 **I-3868-S**

PILOT CHOKE
DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN

(F3)DG5S4-04-(P)(L)(X)-(*)-(E)-(T)(*)-M(P**)-**-*-(9)-(**)-50**

- (F3) — SEALS FOR MINERAL OIL & FIRE RESISTANT FLUIDS
- DG5S4 — DIRECTIONAL CONTROL VALVE MANIFOLD OR SUBPLATE MOUNTED. SOLENOID CONTROLLED PILOT OPERATED. RATED PRESSURE 210 bar (3000 PSI)
- 04 — INTERFACE NFPA-D04 (ISO-4401-07)
- ** — SPOOL TYPES
- SPOOL SPRING ARRANGEMENT
  - A-SPRING OFFSET TO CYL. A
  - B-SPRING CENTERED SOLENOID A REMOVED
  - C-SPRING CENTERED
  - N-NO SPRING DETENTED
- (P) — MANUAL OPERATOR IN PILOT VALVE END CAP. A & B MODELS ONLY *
- (L) — LEFT HAND (SINGLE SOLENOID ONLY *
- (X) — X - FAST RESPONSE (OMIT FOR STD. LOW SHOCK MODELS)
- (*) — SPOOL CONTROL MODIFICATIONS *
  - 1 - STROKE ADJUSTMENT
  - 2 -PILOT CHOKE ADJUSTMENT
  - 3 -PILOT CHOKE & STROKE ADJ.
  - 7 -STROKE ADJ. CYL. "A" ONLY
  - 8 -STROKE ADJ. CYL. "B" ONLY
  - 2-7 -DUAL PILOT CHOKE & STROKE ADJ. "A" PORT END ONLY.
  - 2-8 -DUAL PILOT CHOKE & STROKE ADJ. "B" PORT END ONLY.
- (E) — E - EXTERNAL PILOT PRESSURE *
- (T) — T - INTERNAL PILOT DRAIN *
- (*) — CHECK VALVE IN PRESSURE PORT *
  - K-0. 35 bar (5 PSI CRACKING PRESS.)
  - R-3. 45 bar (50 PSI CRACKING PRESS.)
  - S-5. 20 bar (75 PSI CRACKING PRESS.)
- M — FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS
- (P**) — ELECTRICAL FEATURES REFER TO I-3866-S FOR DETAILED INFORMATION
- ** —
  - U -DIN 43650
  - W -WIRING HSG. ½ NPT. THD.
  - WL -WIRING HSG. ½ NPT. THD. (WITH INDICATOR LIGHT)
- * — COIL IDENTIFICATION LETTER
- (9) — LOW WATTAGE B COIL *
- (**) — PILOT VALVE PORT ORIFICE *
- 50 — DESIGN

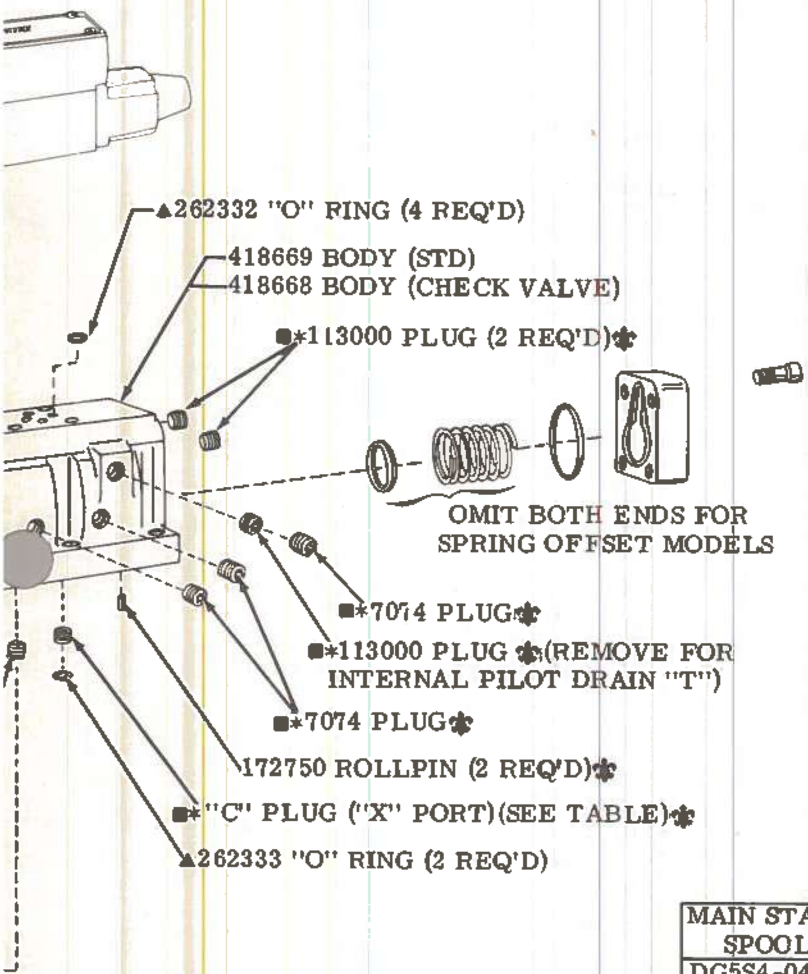
* - OMIT WHEN NOT REQ'D

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

PILOT STAGE ATTACHING BOLTS BOLT KIT INCLUDES 4 BOLTS	
MODEL	BOLT KIT
W/OUT PILOT CHOKE	255698
WITH PILOT CHOKE	466851
TORQUE TO 5.6 N. m MAX. (45 - 50 lb. in.)	
SEE BACK PAGE FOR PILOT CHOKE PARTS BREAKDOWN	

■PLUG INSTALLATION TABLE			
MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S4-04-*-M-*-*-50	DOES NOT EXIST	367427	OUT
DG5S4-04-*-X-M-*-*-50		OUT	
DG5S4-04-*-E-M-*-*-50		113000	367427
DG5S4-04-*-X-E-M-*-*-50			OUT
DG5S4-04-*-K/R/S-M-*-*-50	367427		
DG5S4-04-*-X-K/R/S-M-*-*-50	OUT		
DG5S4-04-*-E-K/R/S-M-*-*-50	113000		367427
DG5S4-04-*-X-E-K/R/S-M-*-*-50			OUT
*113000 SOLID PLUG *367427 ORIFICE PLUG			



■PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
7074	8.5-9.6	75-85
113000	5.0-5.9	45-52
367427	5.0-5.9	45-52

*INCLUDED IN PLUG KIT 926545

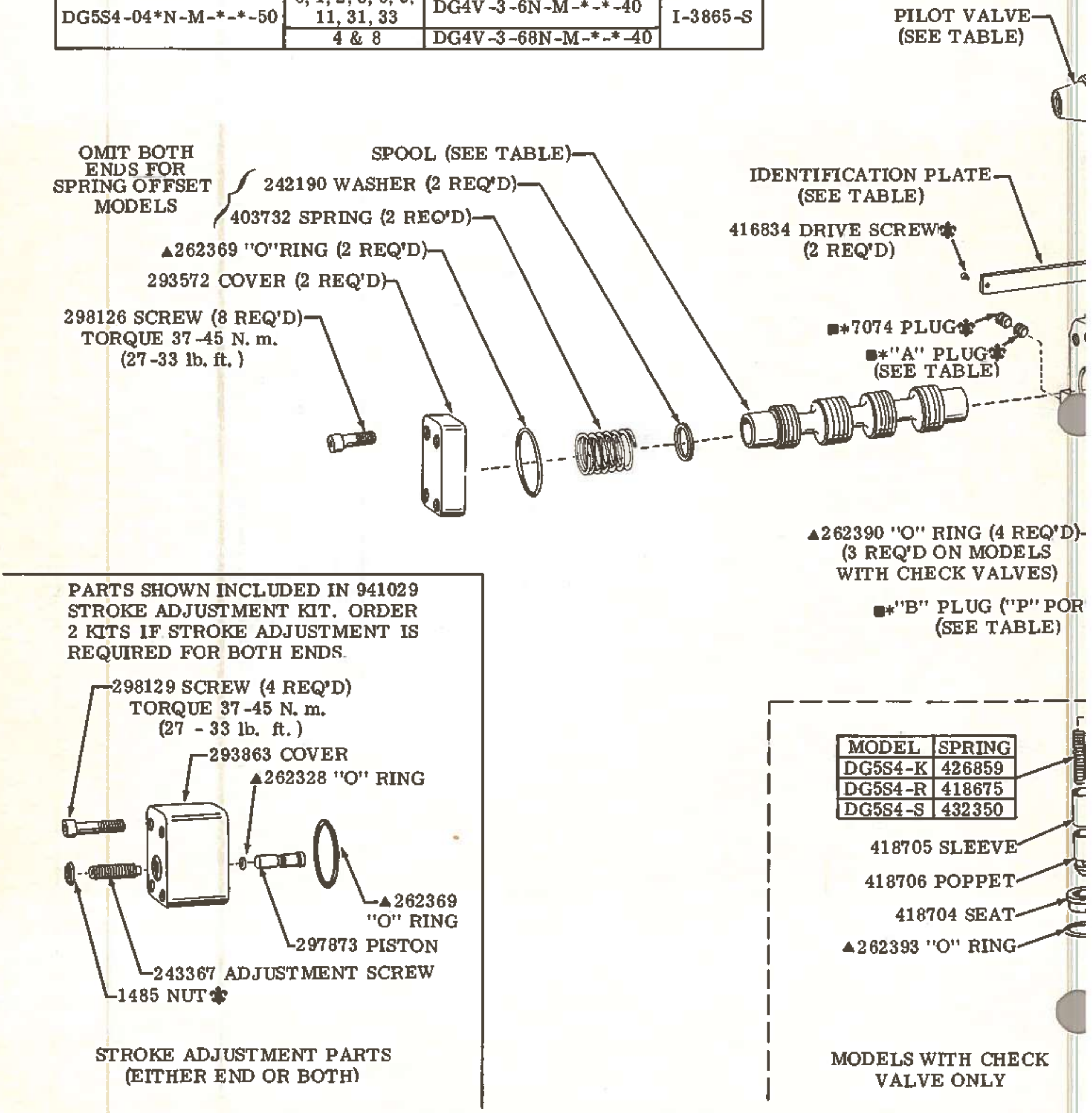
▲INCLUDED IN F3 SEAL KIT 920314

MAIN STAGE SPOOL	AVAILABLE VALVE TYPE	SPOOL	MAIN STAGE ID PLATE A ONLY	MAIN STAGE ID PLATE B/C/N
DG5S4-040		399891		433852
DG5S4-041		*431972		433851
DG5S4-042		399892		433853
DG5S4-043		*399893		433854
DG5S4-044		413481		433855
DG5S4-046	A/B/C/N	399894	433851	433856
DG5S4-048		399896		433855
DG5S4-049		413483		433852
DG5S4-0411		*431972		433851
DG5S4-0431		*399893		433851
DG5S4-0433		399897		433856

*NOTE

ASSEMBLE TYPE 1 & 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END IS DEFINED AS BEING CLOSEST TO CYL. PORT "A". TYPES 11 & 31 SPOOLS ARE INSTALLED IN REVERSE OF TYPES 1 & 3, WITH NARROW CENTER LAND TOWARD "B" END OF VALVE.

VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE	SERVICE DWG.
DG5S4-04*A-M-*-*-50	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-2A-M-*-*-40	I-3861-S
	4 & 8	DG4V-3-28A-M-*-*-40	
DG5S4-04*B-M-*-*-50	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6B-M-*-*-40	I-3862-S
	4 & 8	DG4V-3-68B-M-*-*-40	
DG5S4-04*C-M-*-*-50	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6C-M-*-*-40	I-3863-S
	4 & 8	DG4V-3-68C-M-*-*-40	
DG5S4-04*N-M-*-*-50	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6N-M-*-*-40	I-3865-S
	4 & 8	DG4V-3-68N-M-*-*-40	

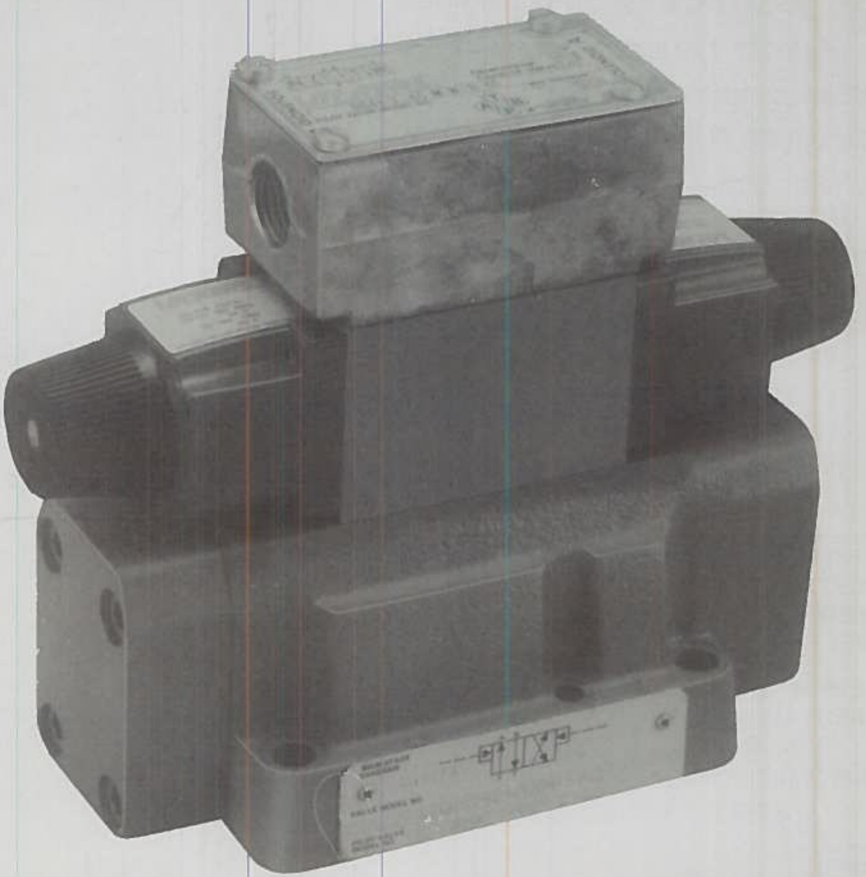


Service Parts Information

VICKERS®
A TRINOVA COMPANY

Solenoid Controlled Pilot Operated Directional Valves

DG5S4-04-**-*-*-M-**-*-50



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

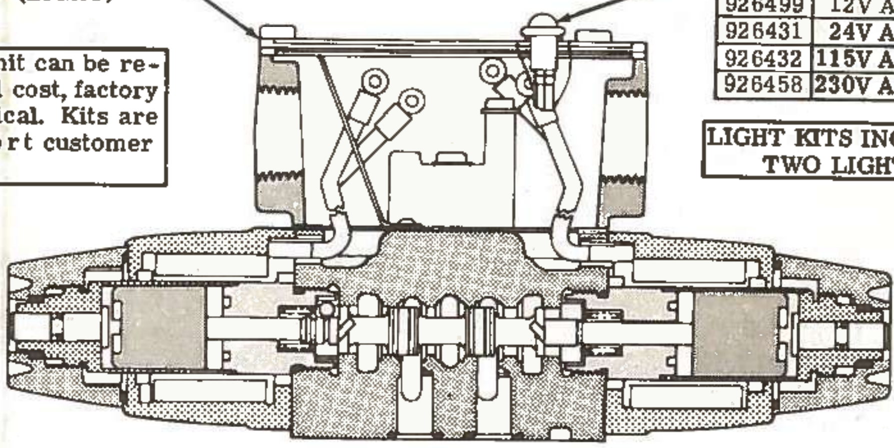
Revised 12-1-87 **I-3867-S**

MODEL CODE BREAKDOWN

DG4V-3-* N-M(P)-**-*-(9)-(***)-40**

- DG — DIRECTIONAL VALVE
- G — SUBPLATE OR MANIFOLD MOUNTED
- 4 — SOLENOID OPERATED
- V — MAXIMUM PRESSURE RATING 350 bar (5000 PSI)
- 3 — INTERFACE NFPA-D01/ ISO-4401-3
- * — SPOOL TYPE
- N — N - NO SPRING DETENTED
- M — FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS
- (P**) — ELECTRICAL FEATURES (REFER TO DWG. I-3866-S)
- ** — U - DIN 43650 COIL; W - WIRING HOUSING ½ NPT THD.; WL - WIRING HOUSING ½ NPT THD. (WITH INDICATOR LIGHT(S)
- * — COIL CODE LETTER (SEE TABLE FOR VOLTAGE AND FREQUENCY)
- (9) — LOW WATTAGE COIL (B COIL ONLY)
- (***) — RESTRICTOR PLUG (A, B, P, OR T PORT) (SEE TABLE FOR ORIFICE DIA. SIZES)
- 40 — DESIGN

As this complete unit can be replaced at a nominal cost, factory repair is not practical. Kits are available to support customer repair.



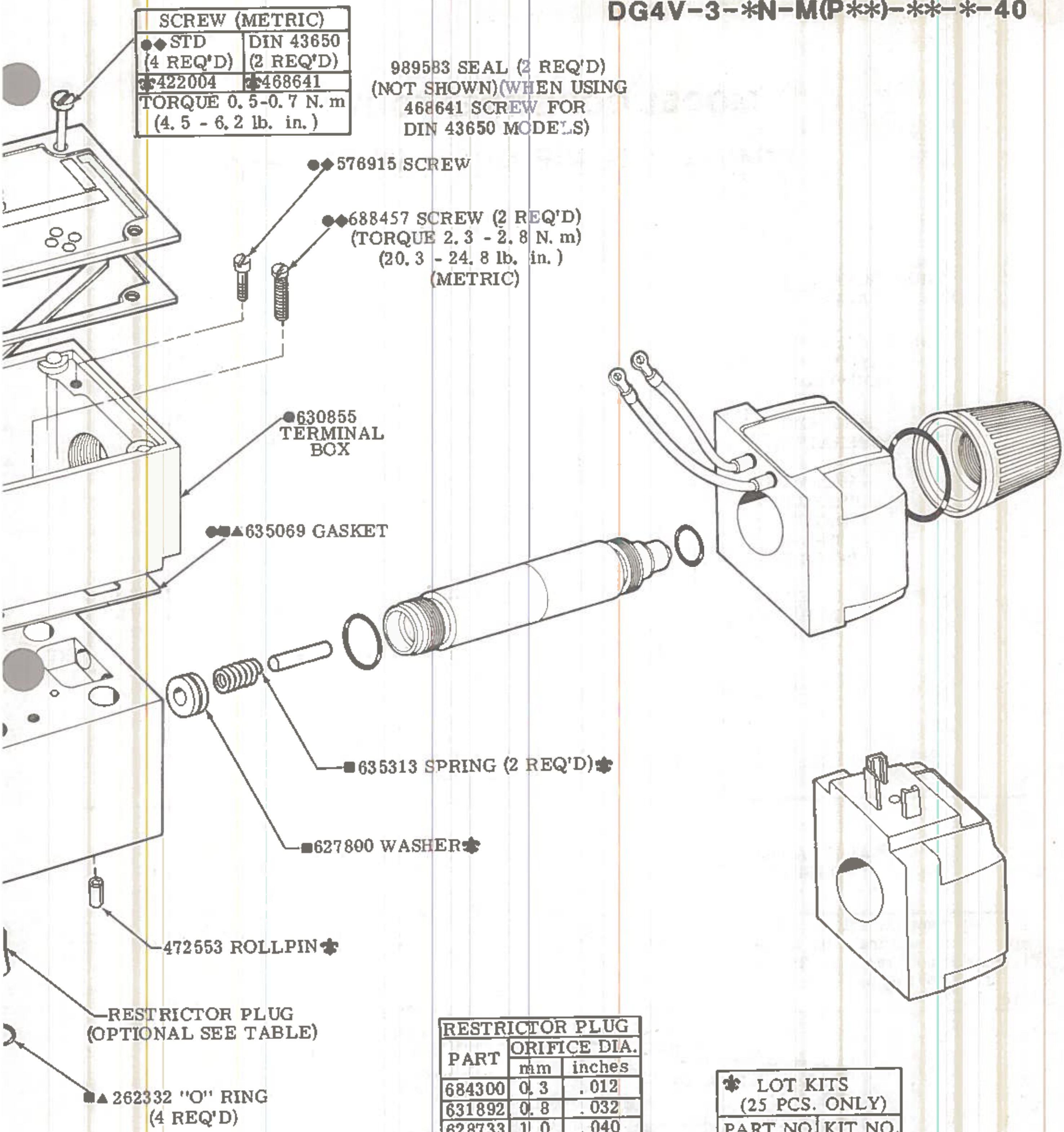
LIGHT KIT	VOLTAGE RANGE
926499	12V AC/DC
926431	24V AC/DC
926432	115V AC/DC
926458	230V AC/DC

LIGHT KITS INCLUDE TWO LIGHTS

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

DG4V-3-*N-M(P**)-**-*-40



RESTRICTOR PLUG		
PART	ORIFICE DIA.	
	mm	inches
684300	0.3	.012
631892	0.8	.032
628733	1.0	.040
632937	1.3	.052
635281	1.5	.060
687072	2.0	.080
631931	2.3	.092
685482	3.2	.128
632936	BLANK	
USE IN EITHER A, B, P, OR T PORT		

✤ LOT KITS (25 PCS. ONLY)	
PART NO.	KIT NO.
422004	944066
468641	944012
635313	944006
627800	944001
472553	944008
453531	944002
635076	944003

DIN 43650 COIL S/A	COIL S/A	AC VOLT Hz	DC VOLT	COIL CODE
635061	633741	110/50, 115/60, 120/60	—	B
683312	989721	110/50, 115/60, 120/60	—	*B-9
635062	633742	220/50, 230/60, 240/60	—	D
683218	989764	24/50, 24/60	—	N
683310	683053	100/50, 100/60	—	T
681611	681404	—	32	DK
681423	989654	—	12	G
681610	989656	—	24	H
682552	682550	—	48	J
*B-9 REDUCED POWER CONSUMPTION COIL				

SPOOL TYPE	SPOOL	■SPOOL KIT
0N	989598	926375
2N	635340	926376
6N/68N	989599	926377
SPOOL KIT ALSO INCLUDES PARTS PREFIXED WITH ▲ AND ■.		

PARTS PREFIXED WITH SYMBOL AVAILABLE ONLY IN KITS

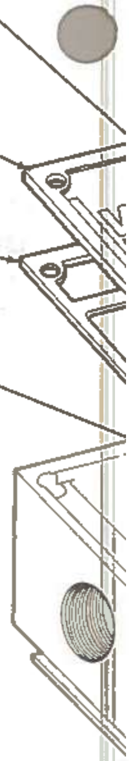
◆INCLUDED IN 926433 FASTENER KIT

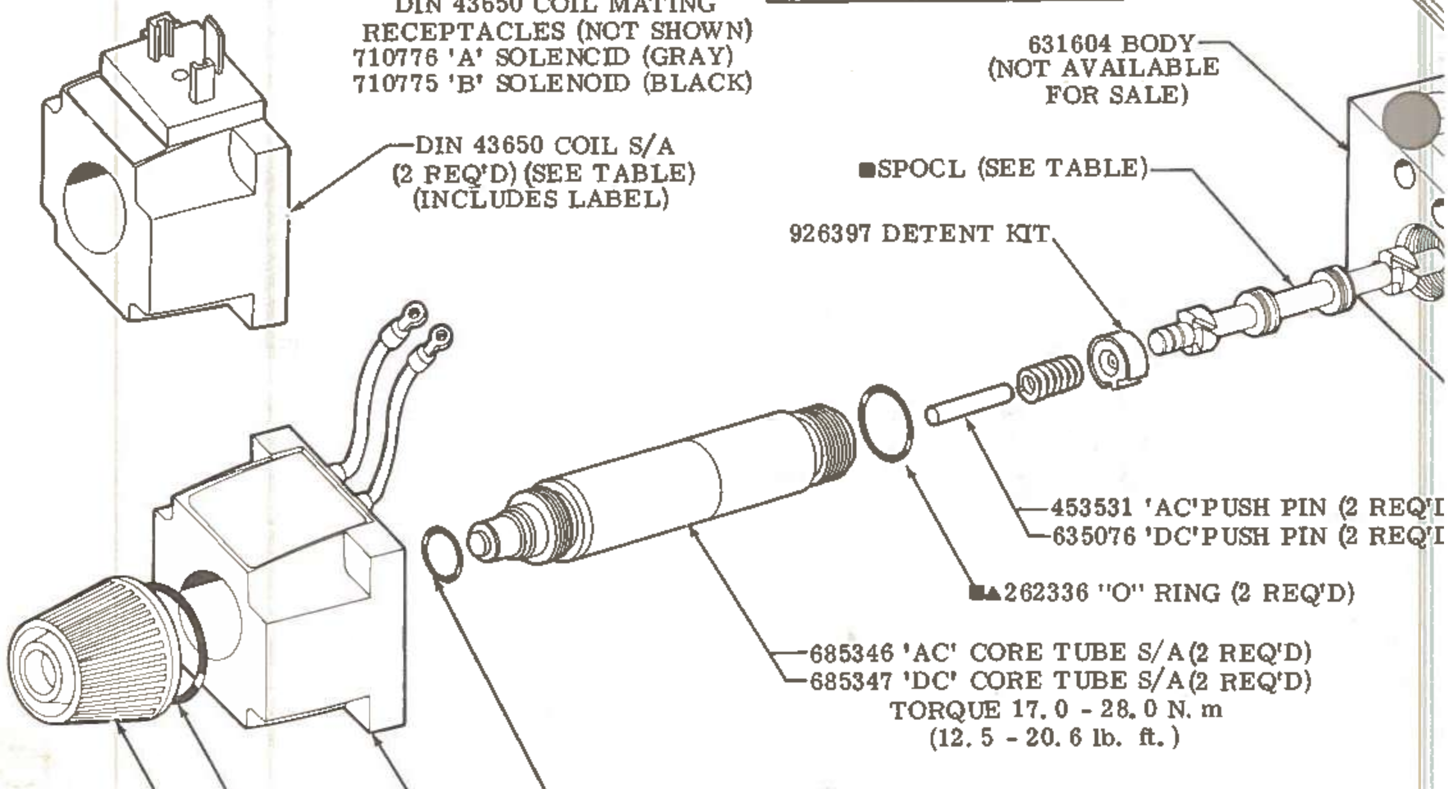
▲INCLUDED IN F3 SEAL KIT 920304

●OMIT WHEN USING MODELS WITH DIN 43650 COILS.

A SPOOL DESIGNATION OF 68N INDICATES VALVE IS USED AS A PILOT FOR TWO STAGE VALVES WITH A 4 OR 8 TYPE MAIN STAGE SPOOL. REFER TO DWGS. J-682451 OR J-685777 FOR CORRECT NAMEPLATE.

REFER TO DWG. I-3866-S FOR ELECTRICAL FEATURES AND OPTIONS



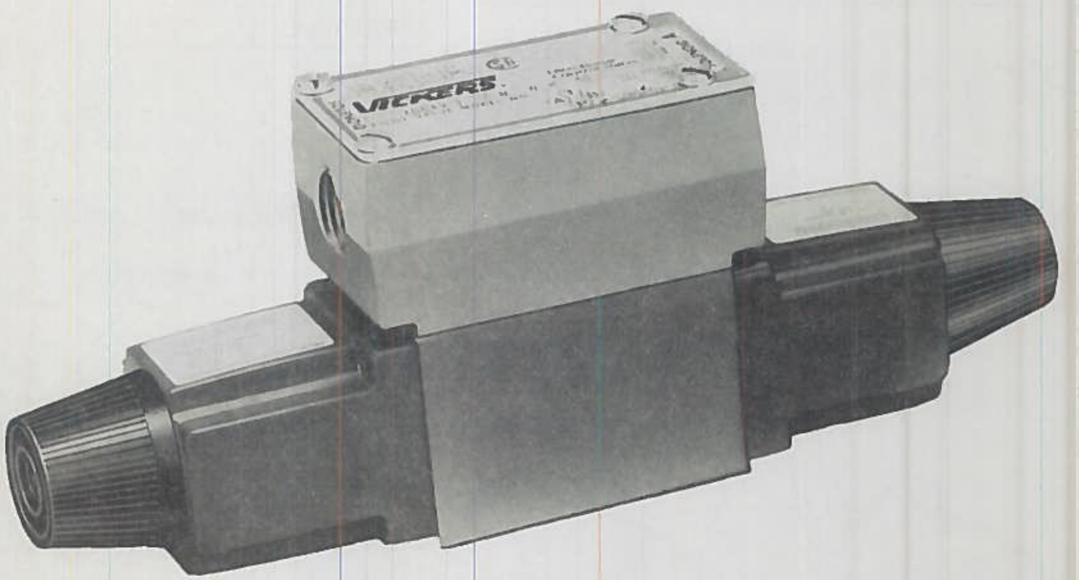


VICKERS®
A TRINOVA COMPANY

Service Parts Information

Solenoid Operated Directional Valve

DG4V-3-*N-M(P**)-**-*-40 Detented



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 5-1-87

I-3865-S

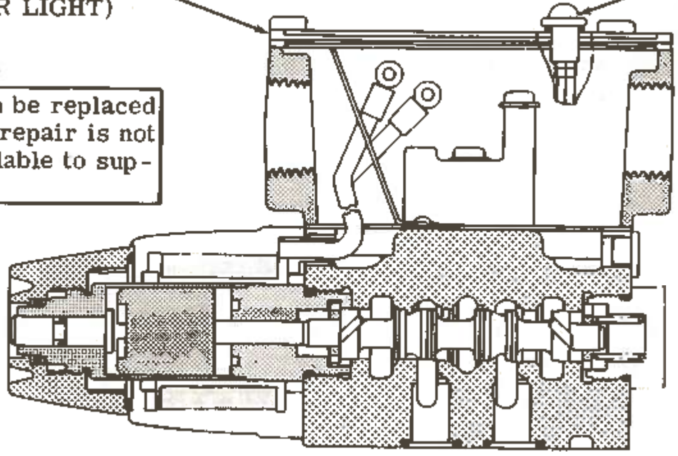
MODEL CODE BREAKDOWN

DG4V-3- * F(P)(L)-M(P)-**-*-(9)-(***)-40**

- DG — DIRECTIONAL VALVE
- G — SUBPLATE OR MANIFOLD MOUNTED
- 4 — SOLENOID OPERATED
- V — MAXIMUM PRESSURE RATING 350 bar (5000 PSI)
- 3 — INTERFACE NFPA-D01/ ISO-4401-3
- * — SPOOL TYPE
- F — F - SPRING OFFSET TO 'A' PORT - SHIFT TO CENTER
- (P) — MANUAL OVERRIDE (OMIT WHEN NOT REQUIRED)
- (L) — LEFT HAND (OMIT WHEN NOT REQ'D)
- M — FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS.
- (P**) — ELECTRICAL FEATURES (REFER TO DWG. I-3866-S)
- ** — U - DIN 43650 COIL; W - WIRING HOUSING ½ NPT THD.; WL - WIRING HOUSING ½ NPT THD. (WITH INDICATOR LIGHT)
- * — COIL CODE LETTER (SEE TABLE FOR VOLTAGE AND FREQUENCY)
- (9) — LOW WATTAGE COIL (B COIL ONLY)
- (***) — RESTRICTOR PLUG (A, B, P, OR T PORT) (SEE TABLE FOR ORIFICE DIA. SIZES)
- 40 — DESIGN

635065 CARRIER (FOR LIGHT)

As this complete unit can be replaced at a nominal cost, factory repair is not practical. Kits are available to support customer repair.



LIGHT KIT	VOLTAGE RANGE
926499	12V AC/DC
926431	24V AC/DC
926432	115V AC/DC
926458	230V AC/DC

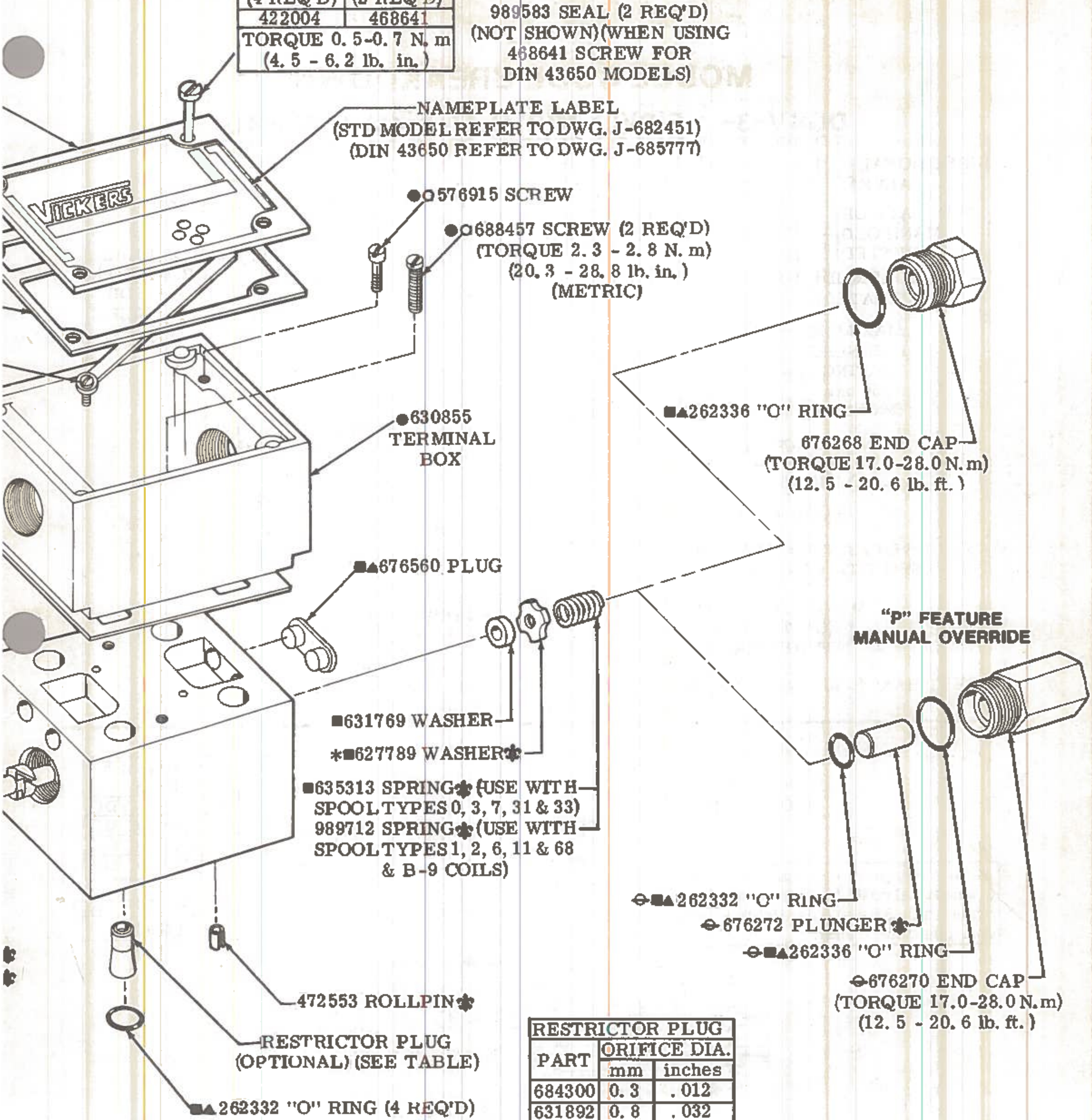
LIGHT KITS INCLUDE TWO LIGHTS

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

DG4V-3-*F-M(P**)-**-*-40

SCREW (METRIC)	
●○STD (4 REQ'D)	DIN 43650 (2 REQ'D)
422004	468641
TORQUE 0. 5-0. 7 N. m (4. 5 - 6. 2 lb. in.)	



▲INCLUDED IN SEAL KIT 920304
○INCLUDED IN FASTENER KIT 926433
⊖INCLUDED IN MANUAL OVERRIDE KIT 926463
✽AVAILABLE ONLY IN KITS OF 25
◆NOT AVAILABLE FOR SALE
●OMIT WHEN USING DIN 43650 COILS
■INCLUDED IN SPOOL KIT (SEE TABLE

RESTRICTOR PLUG		
PART	ORIFICE DIA. mm	ORIFICE DIA. inches
684300	0. 3	. 012
631892	0. 8	. 032
628733	1. 0	. 040
632937	1. 3	. 052
635281	1. 5	. 060
687072	2. 0	. 080
631931	2. 3	. 092
685482	3. 2	. 128
632936	BLANK	
USE IN EITHER A, B, P, OR T PORT		

RIGHT HAND ASSEMBLY SHOWN, EXCEPT 6F & 68F. FOR LEFT HAND ASSEMBLY, ALL PARTS ARE REVERSED, EXCEPT BODY, SPOOL, AND TERMINAL BOX.

DIN 43650 COIL S/A	COIL S/A	AC VOLT Hz	DC VOLT	COIL CODE
635061	633741	110/50, 115/60, 120/60		B
683312	989721	110/50, 115/60, 120/60		*B-9
635062	633742	220/50, 230/60, 240/60	—	D
683218	989764	24/50, 24/60		N
683310	683053	100/50, 100/60		T
681611	681404		32	DK
681423	989654	—	12	G
681610	989656		24	H
682552	682550		48	J

*B-9 REDUCED POWER CONSUMPTION COIL

SPOOL TYPE	SPOOL	■ SPOOL KIT
0F	635338	926369
1/11F	683314	926446
2F	631611	926370
3/31F	989593	926371
6/68F	631603	926372
7F	989592	926373
33F	635339	926374

SPOOL KIT ALSO INCLUDES PARTS PREFIXED WITH ■ AND ▲.

- ASSEMBLE TYPE 1 AND 3 SPOOLS WITH NARROW CENTER LAND TOWARDS 'A' PORT. THE TYPES 11 AND 31 SPOOLS ARE 1 AND 3 SPOOLSREVERSED WITH NARROW CENTER LAND TOWARDS 'B' PORT.
- A SPOOL DESIGNATION OF 68 INDICATES VALVE IS USED AS A PILOT FOR TWO STAGE VALVES WITH 4 OR 8 TYPE MAIN STAGE SPOOLS. 68 IS USED WITH SPRING OFFSET, SHIFT TO CENTER UNITS. REFER TO DWGS. J-682451 & J-685777 FOR CORRECT NAMEPLATE LABEL.

REFER TO I-3866-S FOR ELECTRICAL FEATURES AND OPTIONS

PARTS PREFIXED WITH SYMBOLS AVAILABLE ONLY IN KITS

*ASSEMBLE ROUNDED FACE OF WASHER TO MATE WITH SPOOL

635067 CARRIER (STD I
989585 CARRIER (DIN 4

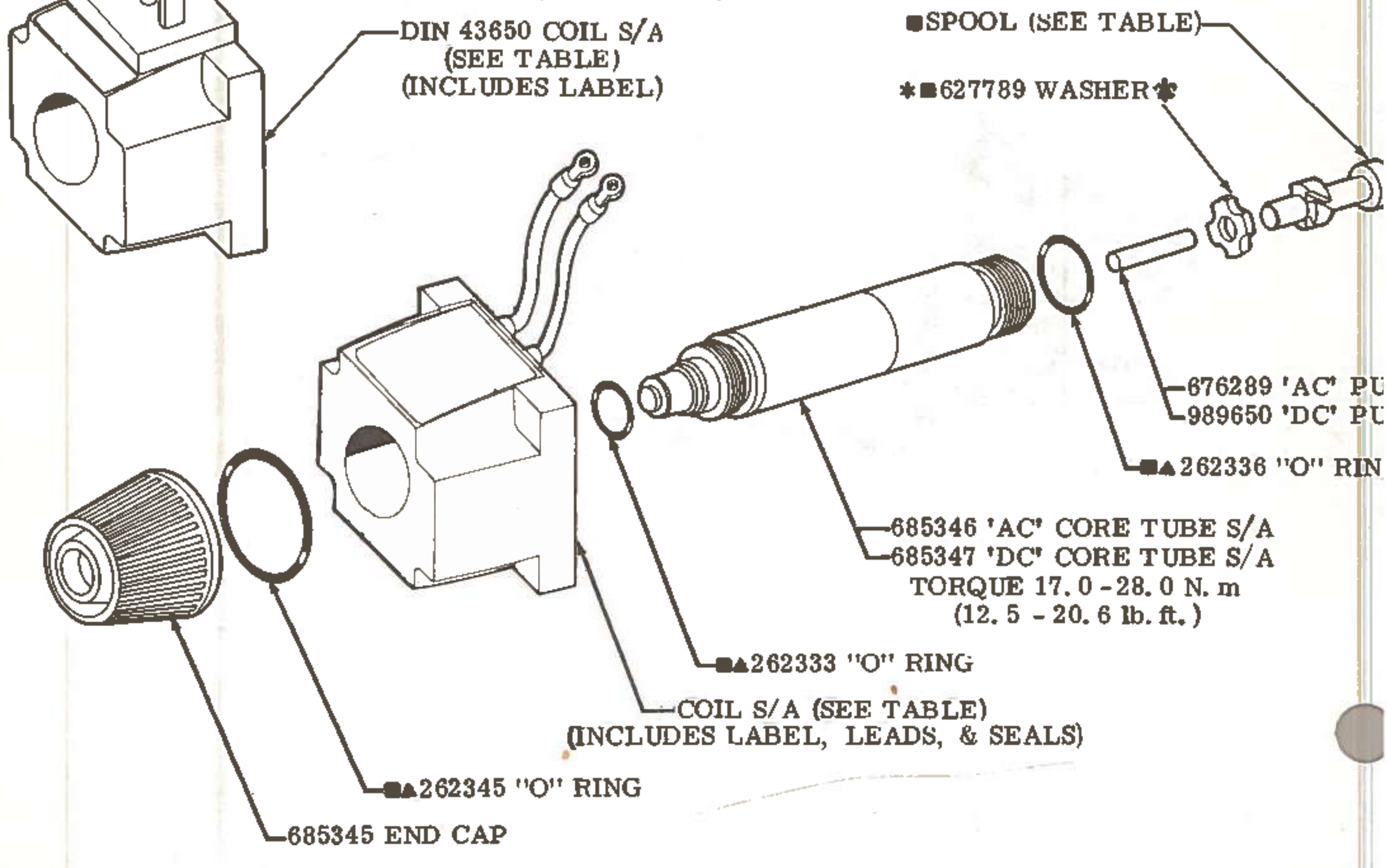
■▲ 633746 GASKET/RETAINER

●○36212 SCREW.

●■▲635069 GASKET

◆631604 BODY

DIN 43650 COIL MATING RECEPTACLES (NOT SHOWN)
710776 'A' SOLENOID (GREY L. H.)
710775 'B' SOLENOID (BLACK R. H.)



VICKERS®
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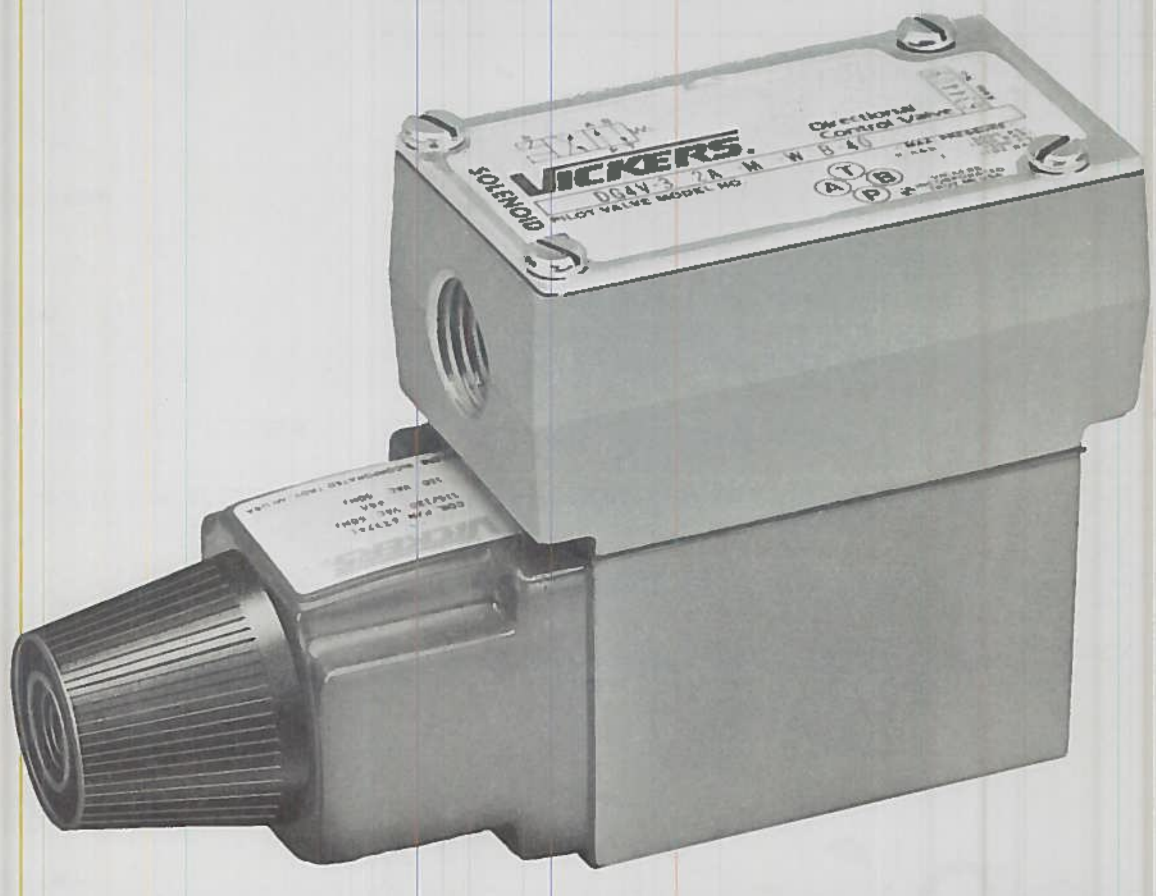
Service Parts Information

Solenoid Operated Directional Valve

DG4V-3-*F-M(P**)-**-*-40 Spring Offset



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007–0302

Revised 7-1-86

I-3864-S

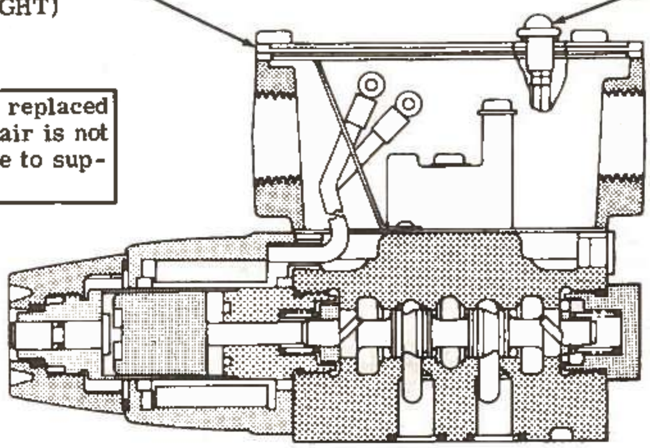
13

MODEL CODE BREAKDOWN

DG4V-3- * B(P)(L)-M(P **)--*-(9)-(***)-40**

- DIRECTIONAL VALVE
- SUBPLATE OR MANIFOLD MOUNTED
- SOLENOID OPERATED
- MAXIMUM PRESSURE RATING 350 bar (5000 PSI)
- INTERFACE NFPA-D01/ ISO-4401-3
- SPOOL TYPE
- B - SPRING CENTERED SOLENOID A REMOVED
- MANUAL OVERRIDE (OMIT WHEN NOT REQUIRED)
- LEFT HAND (OMIT WHEN NOT REQUIRED)
- FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS.
- ELECTRICAL FEATURES (REFER TO DWG. I-3866-S)
- U - DIN 43650 COIL
  W - WIRING HOUSING ½ NPT. THD.
  WL - WIRING HOUSING ½ NPT. THD. (WITH INDICATOR LIGHT)
- COIL CODE LETTER (SEE TABLE FOR VOLTAGE AND FREQUENCY)
- LOW WATTAGE COIL (B COIL ONLY)
- RESTRICTOR PLUG (A, B, P, OR T PORT) (SEE TABLE FOR ORIFICE DIA. SIZES)
- DESIGN

635065 CARRIER (LIGHT)



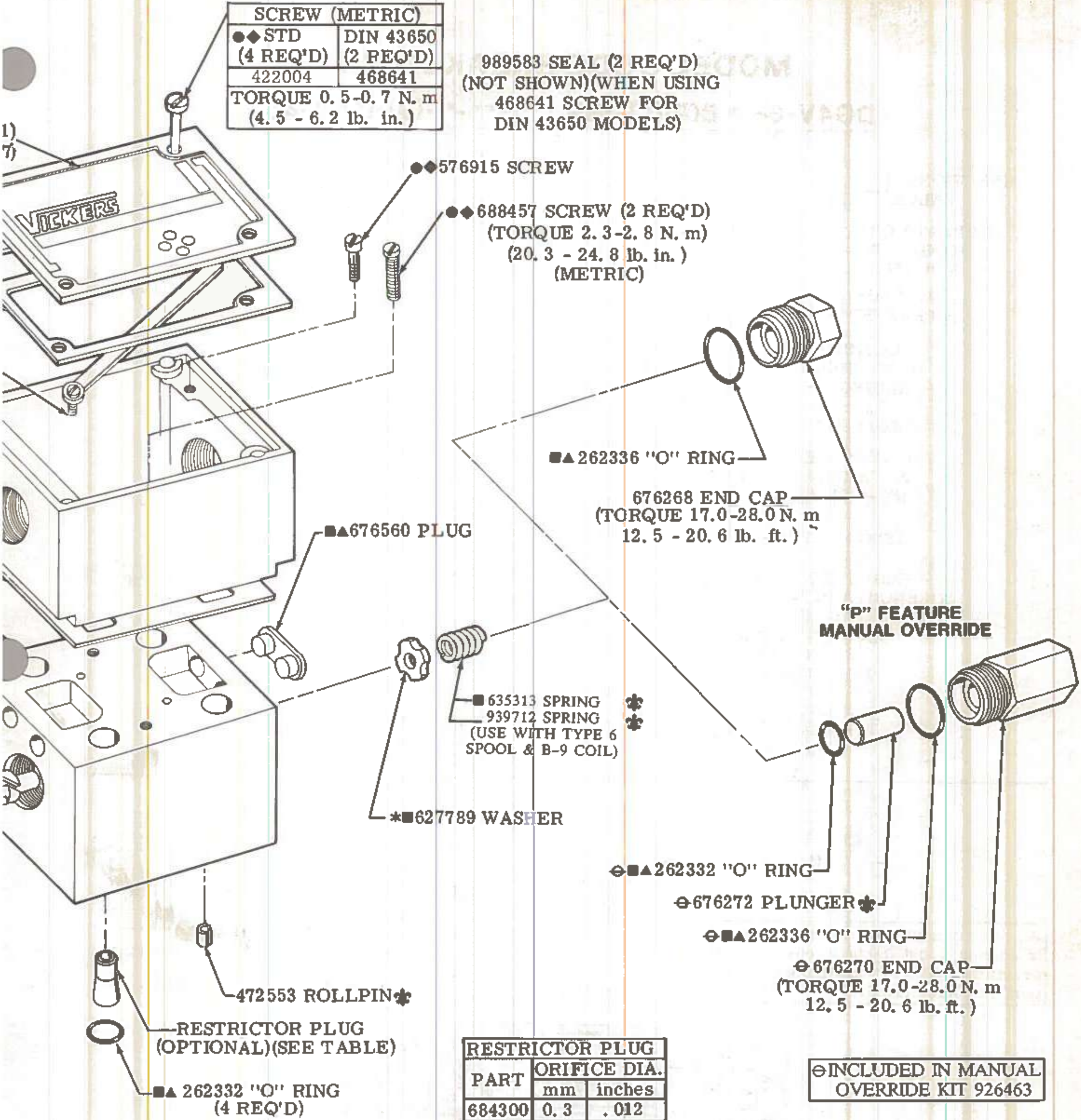
LIGHT KIT	VOLTAGE RANGE
926499	12V AC/DC
926431	24V AC/DC
926432	115V AC/DC
926458	230V AC/DC

LIGHT KITS INCLUDE TWO LIGHTS

As this complete unit can be replaced at a nominal cost, factory repair is not practical. Kits are available to support customer repair.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.



RESTRICTOR PLUG		
PART	ORIFICE DIA.	
	mm	inches
684300	0.3	.012
631892	0.8	.032
628733	1.0	.040
632937	1.3	.052
635281	1.5	.060
687072	2.0	.080
631931	2.3	.092
685482	3.2	.128
632936	BLANK	
USE IN EITHER A, B, P, OR T PORT		

⊖INCLUDED IN MANUAL OVERRIDE KIT 926463

RIGHT HAND ASSEMBLY SHOWN, EXCEPT 8B(P) AND 68B(P). FOR LEFT HAND ASSEMBLY. ALL PARTS ARE REVERSED EXCEPT BODY, SPOOL, AND TERMINAL BOX

DIN43650 COIL S/A	COIL S/A	AC VOLT Hz	DC VOLT	COIL CODE
635061	633741	110/50, 115/60, 120/60	—	B
683312	989721	110/50, 115/60, 120/60		*B-9
635062	633742	220/50, 230/60, 240/60		D
683218	989764	24/50, 24/60		N
683310	683053	100/50, 100/60		T
681611	681404	—	32	DK
681423	989654		12	G
681610	989656		24	H
682552	682550		48	J

*B-9 REDUCED POWER CONSUMPTION COIL

SPOOL TYPE	SPOOL	■SPOOL KIT
0B	635338	926355
1/11B	683314	926565
2B	631611	926356
3/31B	989593	926357
6/68B	631603	926358
7B	989592	926359
8B-S288	630305	926360
33B	635339	926361

SPOOL KIT ALSO INCLUDES PARTS PREFIXED WITH ▲ AND ■.

◆INCLUDED IN 926433 FASTENER KIT

▲INCLUDED IN F3 SEAL KIT 920304

REFER TO DRAWING I-3866-S FOR ELECTRICAL FEATURES & OPTIONS.

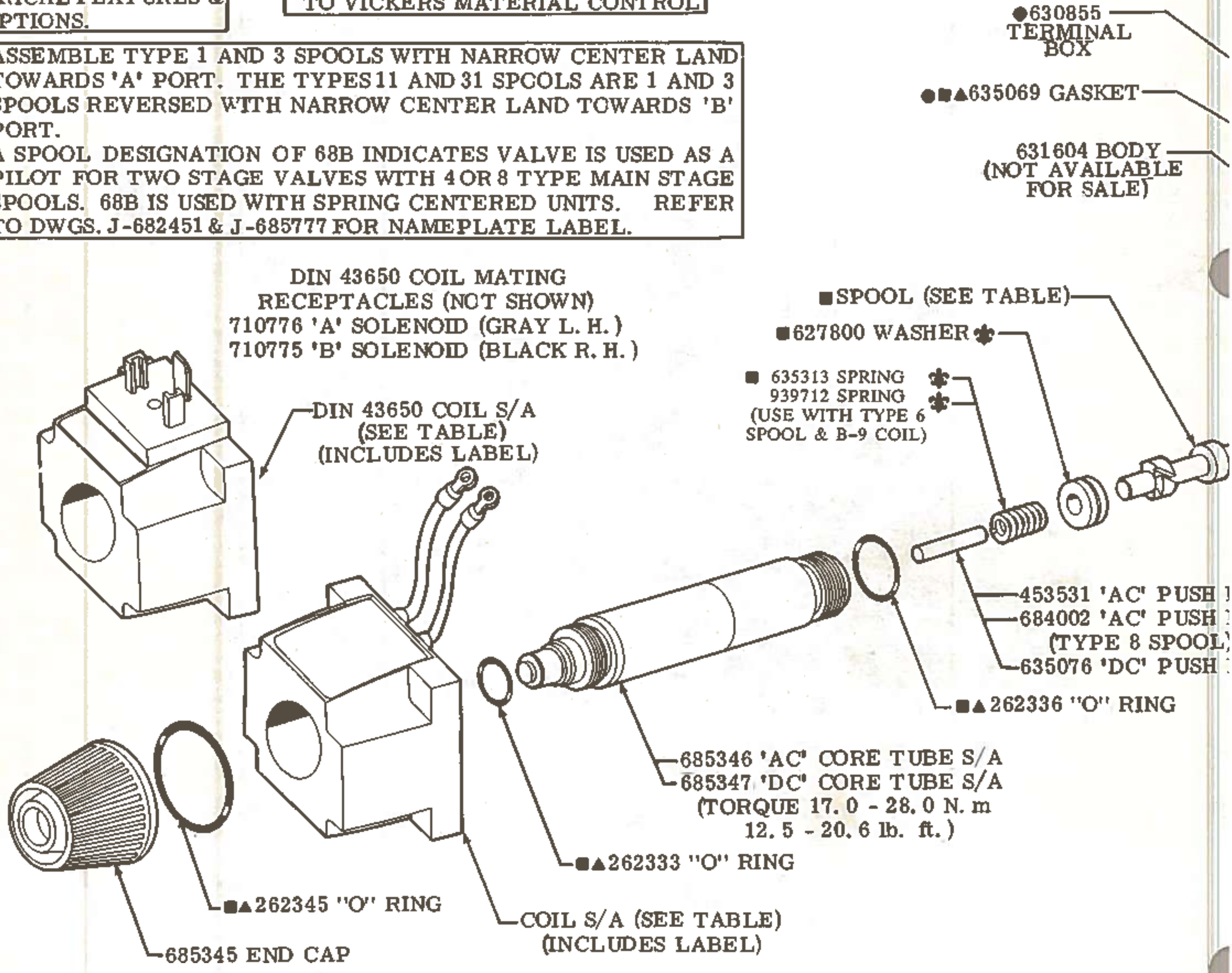
*ASSEMBLE ROUNDED FACE OF WASHER TO MATE WITH SPOOL

PARTS PREFIXED WITH SYMBOLS AVAILABLE ONLY IN KITS

✽SUFFIX SYMBOL PERTAINS ONLY TO VICKERS MATERIAL CONTROL

●OMIT WHEN USING MODELS WITH DIN 43650 COILS.

-ASSEMBLE TYPE 1 AND 3 SPOOLS WITH NARROW CENTER LAND TOWARDS 'A' PORT. THE TYPES 11 AND 31 SPOOLS ARE 1 AND 3 SPOOLS REVERSED WITH NARROW CENTER LAND TOWARDS 'B' PORT.
-A SPOOL DESIGNATION OF 68B INDICATES VALVE IS USED AS A PILOT FOR TWO STAGE VALVES WITH 4 OR 8 TYPE MAIN STAGE SPOOLS. 68B IS USED WITH SPRING CENTERED UNITS. REFER TO DWGS. J-682451 & J-685777 FOR NAMEPLATE LABEL.



VICKERS®
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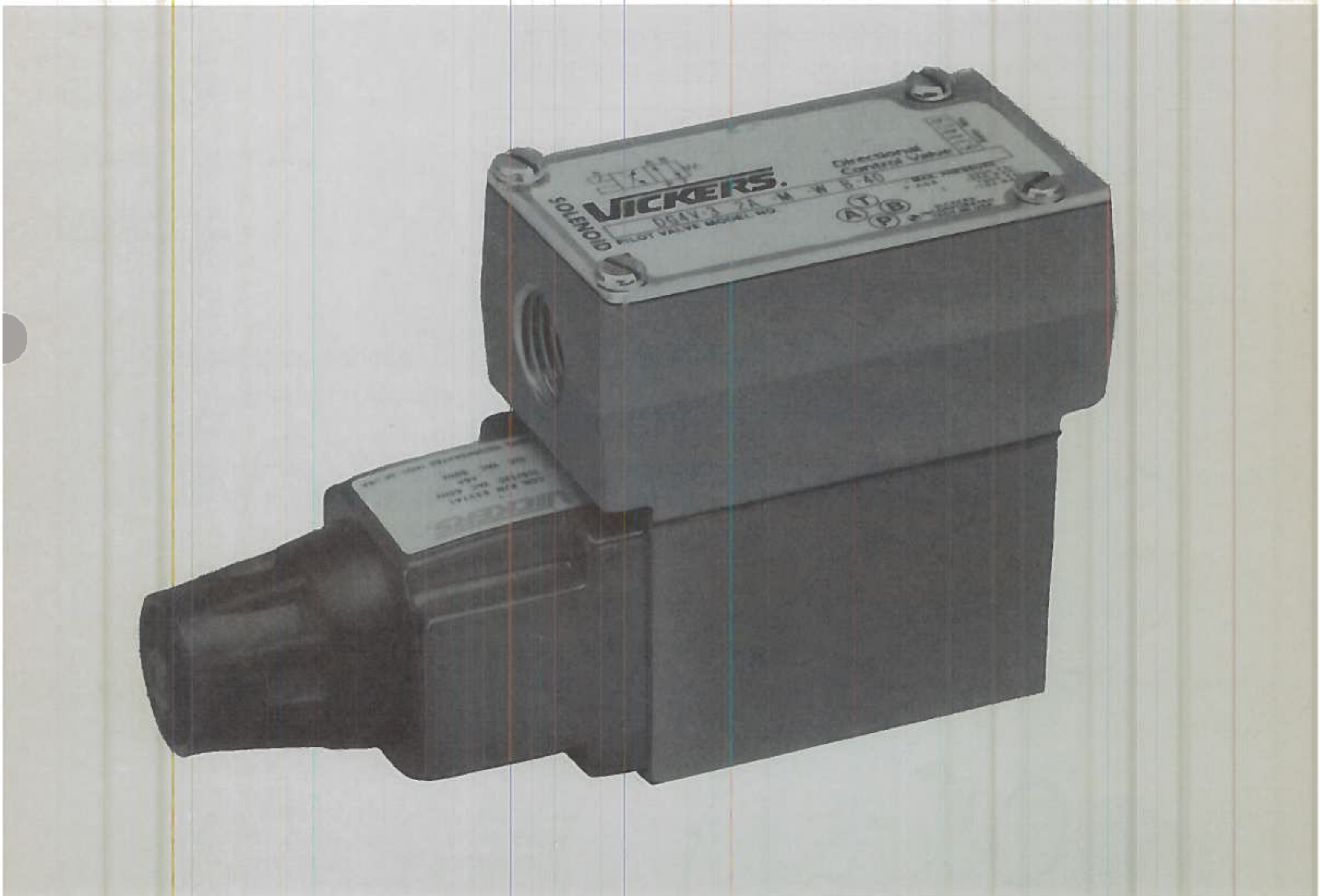
Service Parts Information

Solenoid Operated Directional Valve

DG4V-3-*B-M(P**)-**-*-40 Spring Centered



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

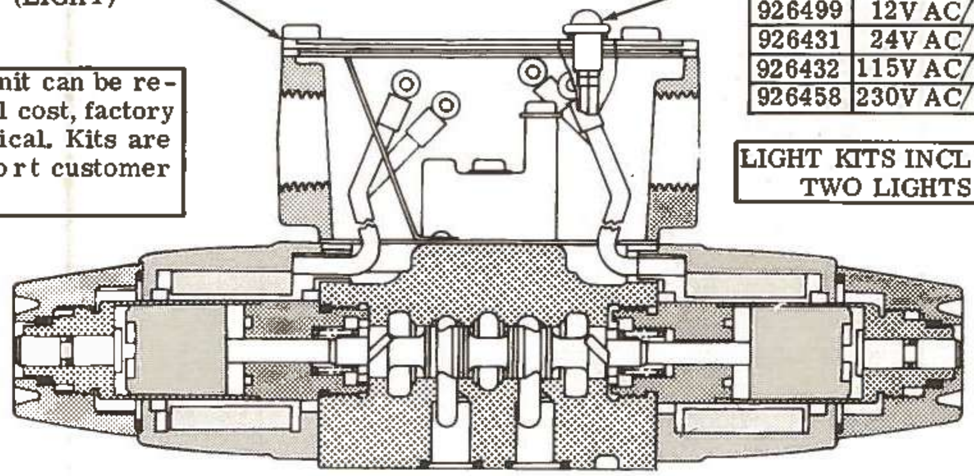
Revised 12-1-87

I-3862-S

MODEL CODE BREAKDOWN

DG4V-3- * C -M(P)-**- * -(9)- (***)-40**

- DG — DIRECTIONAL VALVE
- G — SUBPLATE OR MANIFOLD MOUNTED
- 4 — SOLENOID OPERATED
- V — MAXIMUM PRESSURE RATING 350 bar (5000 PSI)
- 3 — INTERFACE NFPA-D01/ ISO-4401-3
- * — SPOOL TYPE
- C — C - SPRING CENTERED
- M — FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS.
- (P**) — ELECTRICAL FEATURES (REFER TO DWG. I-3866-S)
- ** — U - DIN 43650 COIL; W - WIRING HOUSING ½ NPT THD.; WL - WIRING HOUSING ½ NPT THD. (WITH INDICATOR LIGHT(S)
- * — COIL CODE LETTER (SEE TABLE FOR VOLTAGE AND FREQUENCY)
- (9) — LOW WATTAGE COIL (B COIL ONLY)
- (***) — RESTRICTOR PLUG (A, B, P, OR T PORT). (SEE TABLE FOR ORIFICE DIA. SIZES)
- 40 — DESIGN



As this complete unit can be replaced at a nominal cost, factory repair is not practical. Kits are available to support customer repair.

LIGHT KIT	VOLTAGE RANGE
926499	12V AC/DC
926431	24V AC/DC
926432	115V AC/DC
926458	230V AC/DC

LIGHT KITS INCLUDE TWO LIGHTS

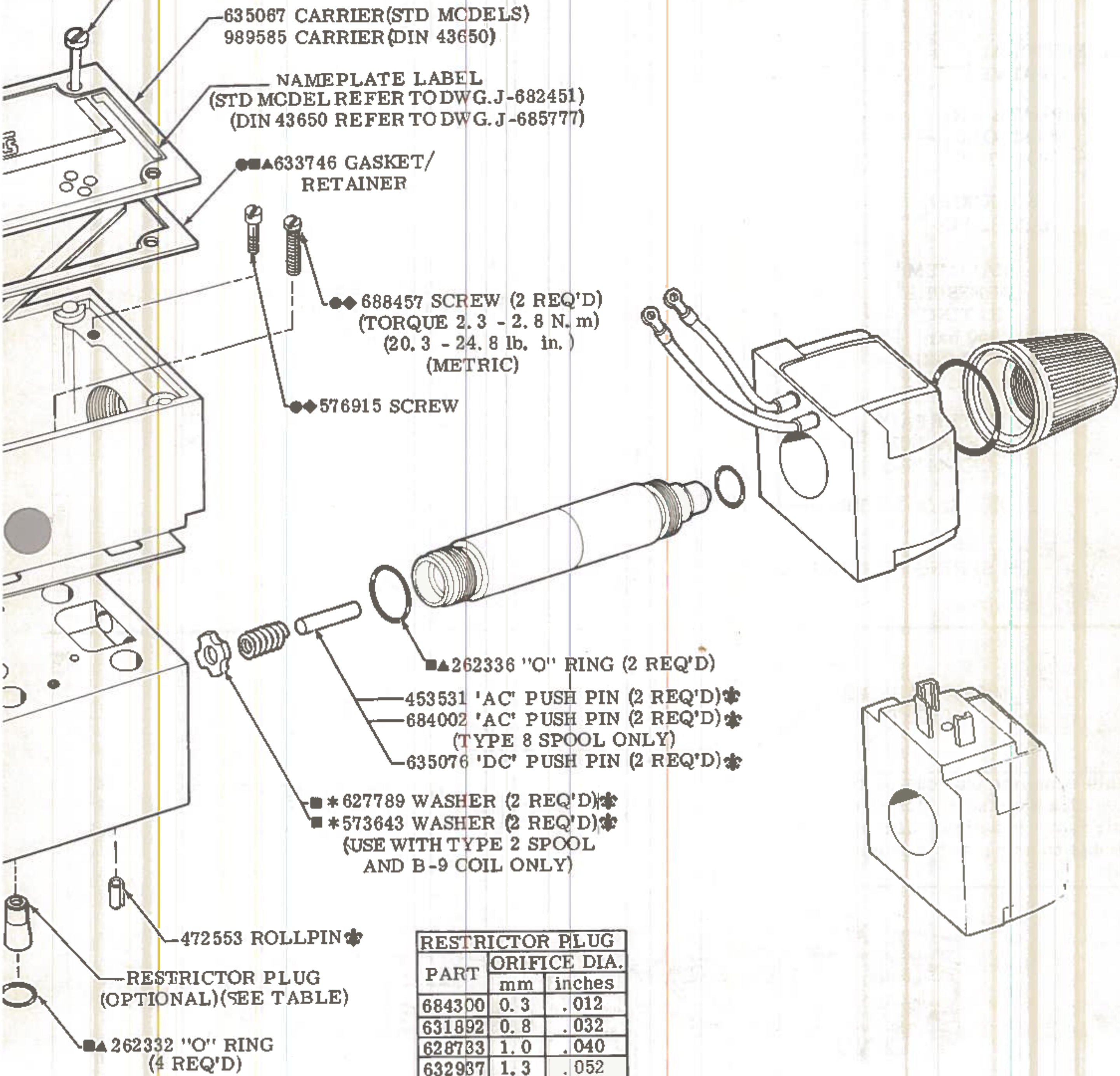
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

DG4V-3-*C-M(P**)-**-*-40

SCREW (METRIC)	
●◆STD (4 REQ'D)	DIN 43650 (2 REQ'D)
422004⚜	468641
TORQUE 0. 5-0. 7 N. m (4. 5 - 6. 2 lb. in.)	

989583 SEAL (2 REQ'D) (NOT SHOWN)(WHEN USING 468641 SCREW FOR DIN 43650 MODELS)



RESTRICTOR PLUG		
PART	ORIFICE DIA.	
	mm	inches
684300	0. 3	.012
631892	0. 8	.032
628733	1. 0	.040
632937	1. 3	.052
635281	1. 5	.060
687072	2. 0	.080
631931	2. 3	.092
685482	3. 2	.128
632936	BLANK	
USE IN EITHER A, B, P, OR T PORT		

DIN 43650 COIL S/A	COIL S/A	AC VOLT Hz	DC VOLT	COIL CODE
635061	633741	110/50, 115/60, 120/60		B
683312	989721	110/50, 115/60, 120/60		*B-9
635062	633742	220/50, 230/60, 240/60	—	D
683218	989764	24/50, 24/60		N
683310	683053	100/50, 100/60		T
681611	681404		32	DK
681423	989654	—	12	G
681610	989656		24	H
682552	682550		48	J
*B-9 REDUCED POWER CONSUMPTION COIL				

SPOOL TYPE	SPOOL	■SPOOL KIT
0C	635338	926362
1/11C	683314	926446
2C	631611	926363
3/31C	989593	926364
6/68C	631603	926365
7/78C	989592	926366
8C-S288	630305	926367
33C	635339	926368
SPOOL KIT ALSO INCLUDES PARTS PREFIXED WITH ▲ AND ■.		

*ASSEMBLE ROUNDED FACE OF WASHER TO MATE WITH SPOOL

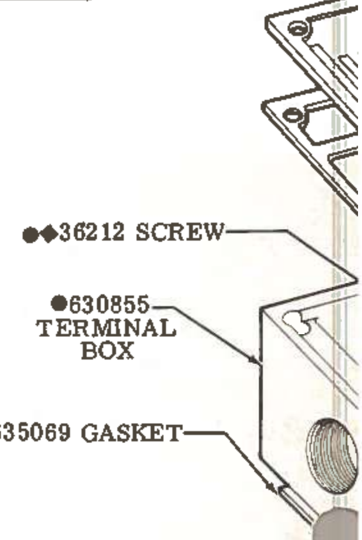
PARTS PREFIXED WITH SYMBOLS AVAILABLE ONLY IN KITS

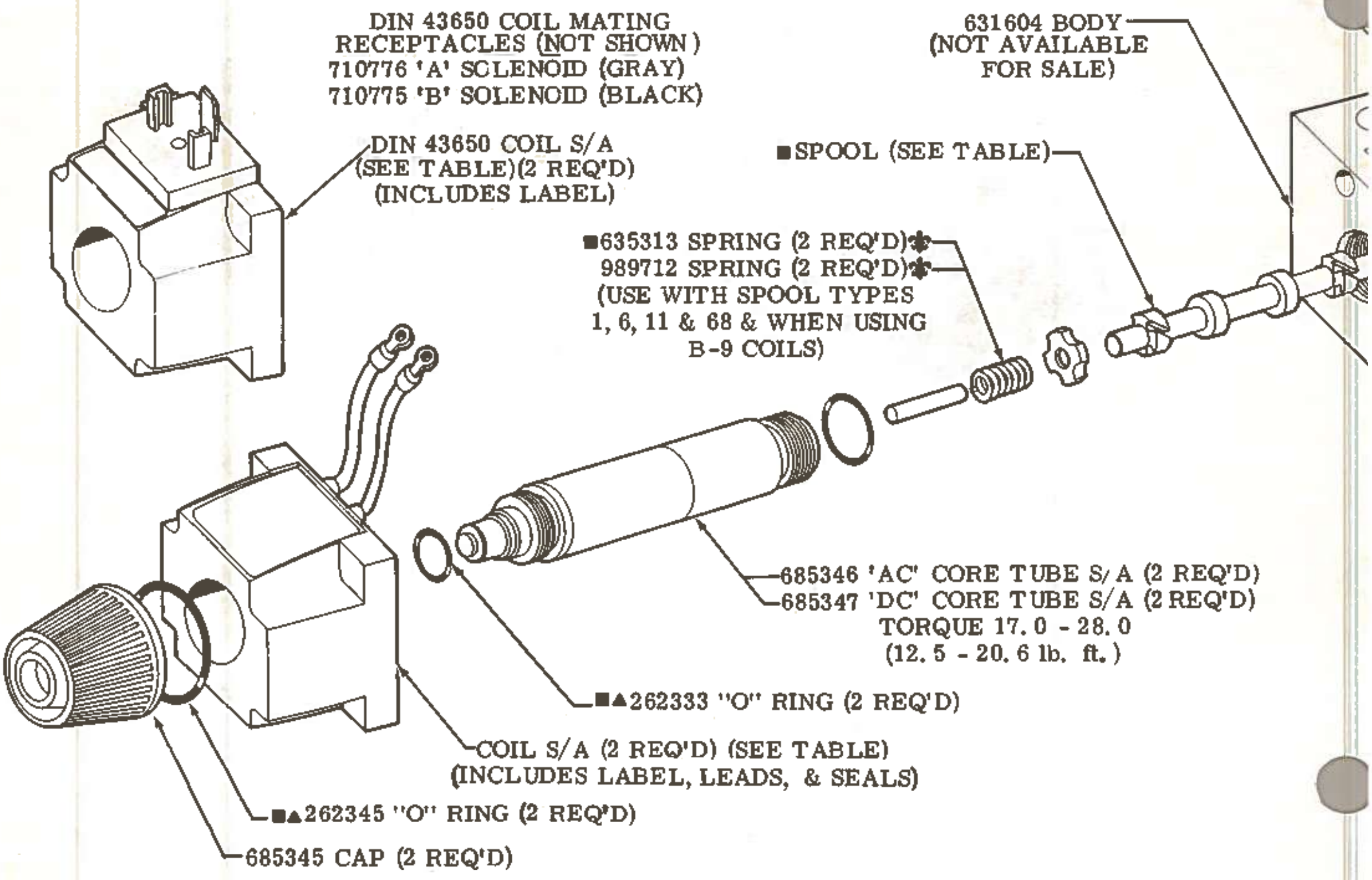
REFER TO DWG. I-3866-S FOR ELECTRICAL FEATURES AND OPTIONS

▲INCLUDED IN F3 SEAL KIT 920304
◆INCLUDED IN FASTENER KIT 926433
✽AVAILABLE ONLY IN KITS OF 25
●OMIT WHEN USING DIN 43650 COILS

-ASSEMBLE TYPE 1 AND 3 SPOOLS WITH NARROW CENTER LAND TOWARDS 'A' PORT. THE TYPES 11 AND 31 SPOOLS ARE 1 AND 3 SPOOLS REVERSED WITH NARROW CENTER LAND TOWARDS 'B' PORT.

-A SPOOL DESIGNATICN OF 68C/78C INDICATES VALVE IS USED AS A PILOT FOR TWO STAGE VALVES WITH 4 OR 8 TYPE MAIN STAGE SPOOLS. 68C IS USED WITH SPRING CENTERED UNITS. 78C IS USED WITH PRESSURE CENTERED UNITS. REFER TO DWG J-682451 AND J-685777 FOR CORRECT NAMEPLATE LABEL.





VICKERS®
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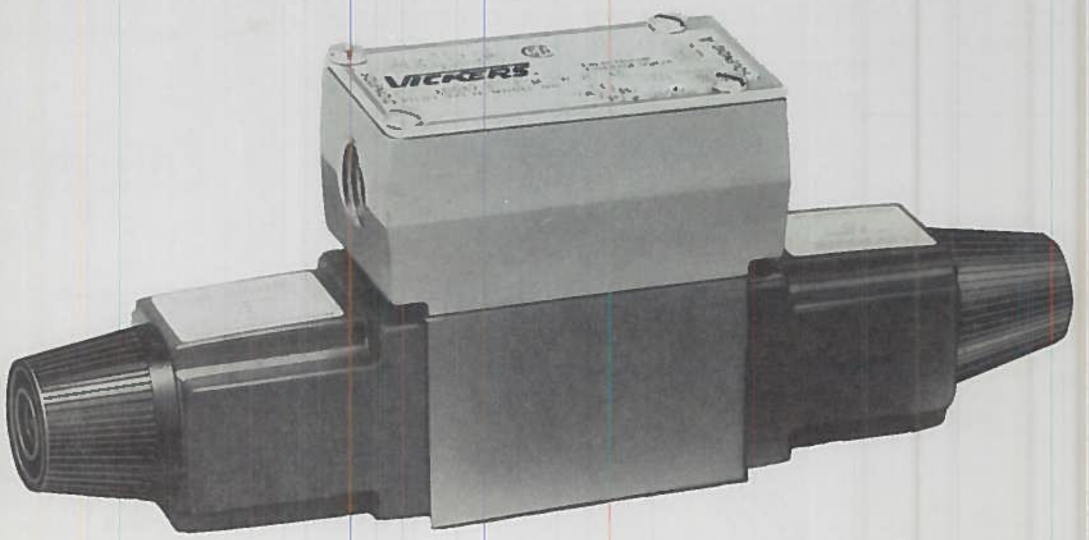
Service Parts Information

Solenoid Operated Directional Valve

DG4V-3-*C-M(P**)-**-*-40 Spring Centered



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007–0302

Revised 8-1-86

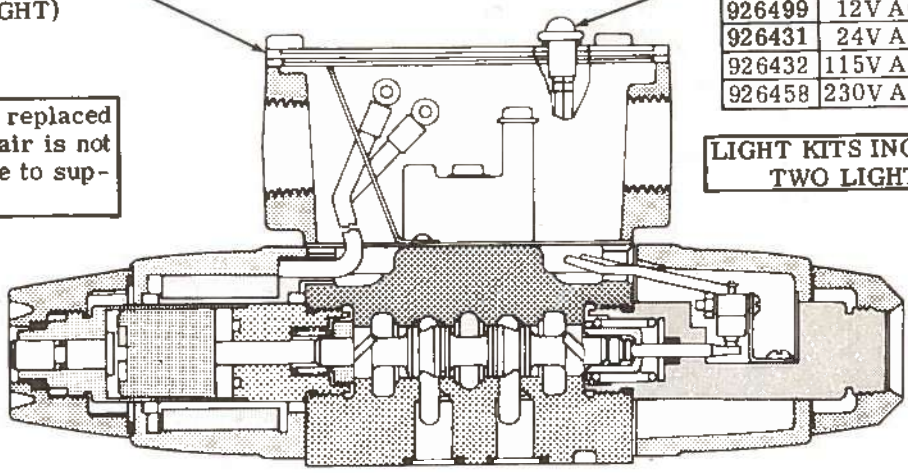
I-3863-S

MODEL CODE BREAKDOWN

DG4V-3-*(*)*(L)-MS(*)(P)-**-*-(9)-(***)-40**

- DG — DIRECTIONAL VALVE
- 4 — SUBPLATE OR MANIFOLD MOUNTED
- V — SOLENOID OPERATED
- (V) — MAXIMUM PRESSURE RATING 350 bar (5000 PSI)
- 3 — INTERFACE NFPA-D01/ ISO-4401-3
- * — SPOOL TYPE
- (*) — A - SPRING OFFSET; B - SPRING CENTERED
- (L) — LEFT HAND (OMIT WHEN NOT REQ'D)
- M — FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS
- S — MONITOR SWITCH
- (*) — 1 - WIRED NO; 2 - WIRED NC (PA, PA5 & PB MODELS ONLY); BLANK - UNWIRED
- (P**) — ELECTRICAL FEATURES (REFER TO DWG I-3866-S)
- ** — W - WIRING HOUSING $\frac{1}{2}$ NPT. THD.; WL - WIRING HOUSING $\frac{1}{2}$ NPT. THD. (WITH INDICATOR LIGHT)
- * — COIL CODE LETTER (SEE TABLE FOR VOLTAGE AND FREQUENCY)
- (9) — LOW WATTAGE COIL (B COIL ONLY)
- (***) — RESTRICTOR PLUG (A, B, OR P PORT)
- 40 — DESIGN

635065 CARRIER (LIGHT)



LIGHT KIT	VOLTAGE RANGE
926499	12V AC/DC
926431	24V AC/DC
926432	115V AC/DC
926458	230V AC/DC

LIGHT KITS INCLUDE TWO LIGHTS

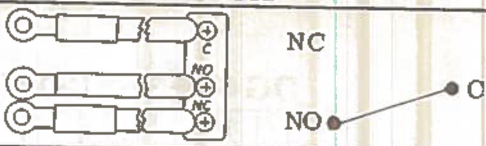
As this complete unit can be replaced at a nominal cost, factory repair is not practical. Kits are available to support customer repair.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

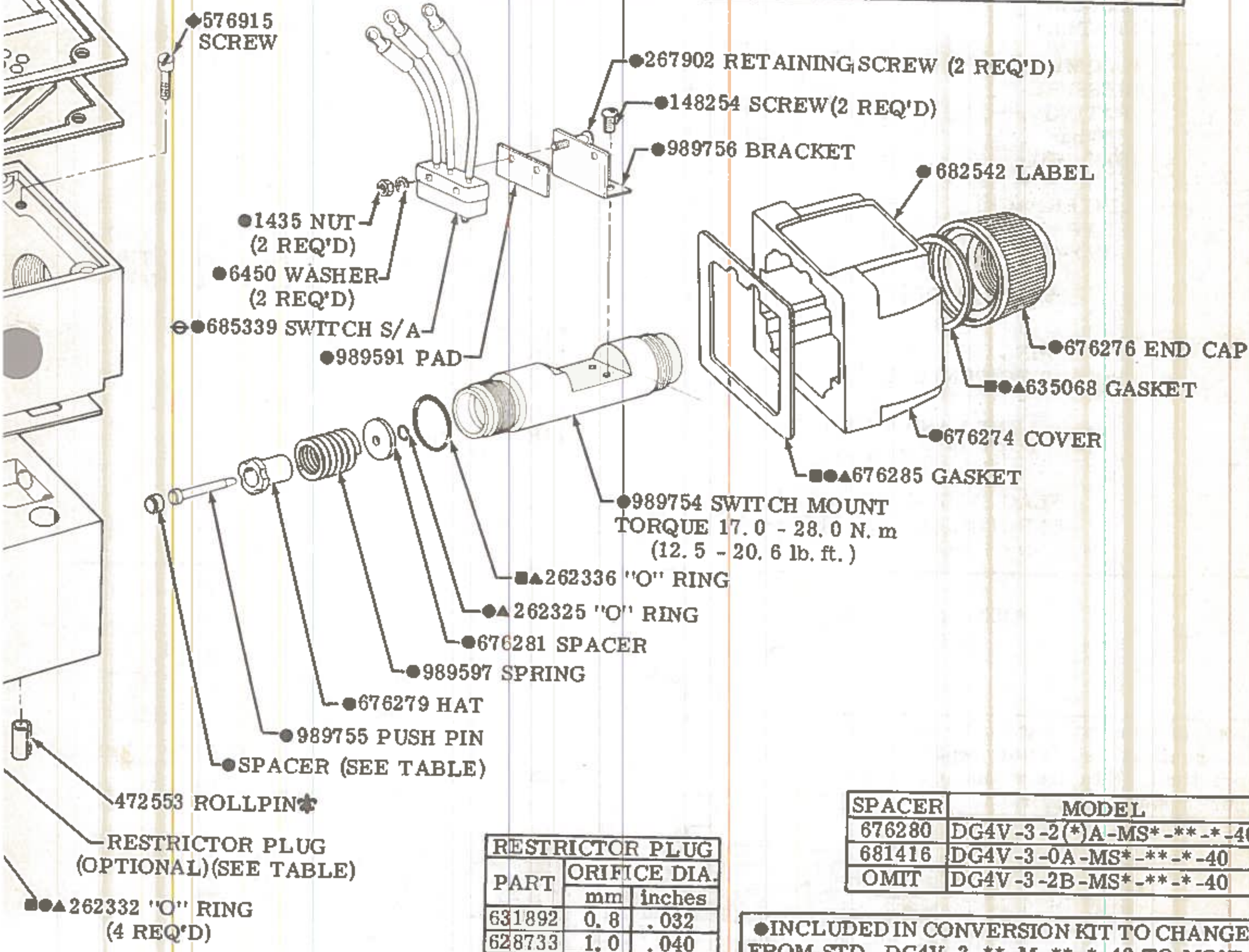
MONITOR SWITCH CHARACTERISTICS

WIRE SLEEVING COLOR CODE
BLACK SLEEVING - C
NO SLEEVING - NO
WHITE SLEEVING - NC



⊖ MONITOR SWITCH ADJUSTMENT PROCEDURE

REMOVE COVER AND ENERGIZE SOLENOID. LOOSEN SWITCH RETAINING SCREWS AND POSITION SWITCH TO OBTAIN COMPLETE CIRCUIT FROM COMMON THRU NORMALLY OPEN (NO) CONTACTS. DE-ENERGIZE SOLENOID. MAKE SURE SWITCH RETURNS TO NORMALLY OPEN POSITION BEFORE INSTALLING COVER.



SPACER	MODEL
676280	DG4V-3-2(*)A-MS*-**-*-40
681416	DG4V-3-0A-MS*-**-*-40
OMIT	DG4V-3-2B-MS*-**-*-40

RESTRICTOR PLUG		
PART	ORIFICE DIA.	
	mm	inches
631892	0.8	.032
628733	1.0	.040
632937	1.3	.052
635281	1.5	.060
631931	2.3	.092
632936	BLANK	
USE IN EITHER A, B, OR P PORT		

●INCLUDED IN CONVERSION KIT TO CHANGE FROM STD. DG4V-3-**-M-**-*-40 TO MONITOR SWITCH FEATURE. KITS AVAILABLE ONLY FOR SPOOL TYPES LISTED BELOW:

● KIT	MODEL
926506	DG4V-3-0A-MS*-**-*-40
926507	DG4V-3-2(*)A-MS*-**-*-40
926508	DG4V-3-2B-MS*-**-*-40

COIL S/A	AC VOLT Hz	DC VOLT	COIL CODE
633741	110/50, 115/60, 120/60	—	B
989721	110/50, 115/60, 120/60		*B-9
633742	220/50, 230/60, 240/60		D
989764	24/50, 24/60		N
683053	100/50, 100/60		T
681404	—	32	DK
989654		12	G
989656		24	H
682550		48	J

*B-9 REDUCED POWER CONSUMPTION COIL

SPOOL TYPE	SPOOL	■SPOOL KIT
0A	989594	926509
2/28A	631615	926510
22A	989649	926511
2B	631611	926512

SPOOL KIT ALSO INCLUDES PARTS PREFIXED WITH ■ AND ▲.

▲INCLUDED IN F3 SEAL KIT 920334

REFER TO DWG. I-3866-S FOR ELECTRICAL FEATURES & OPTIONS

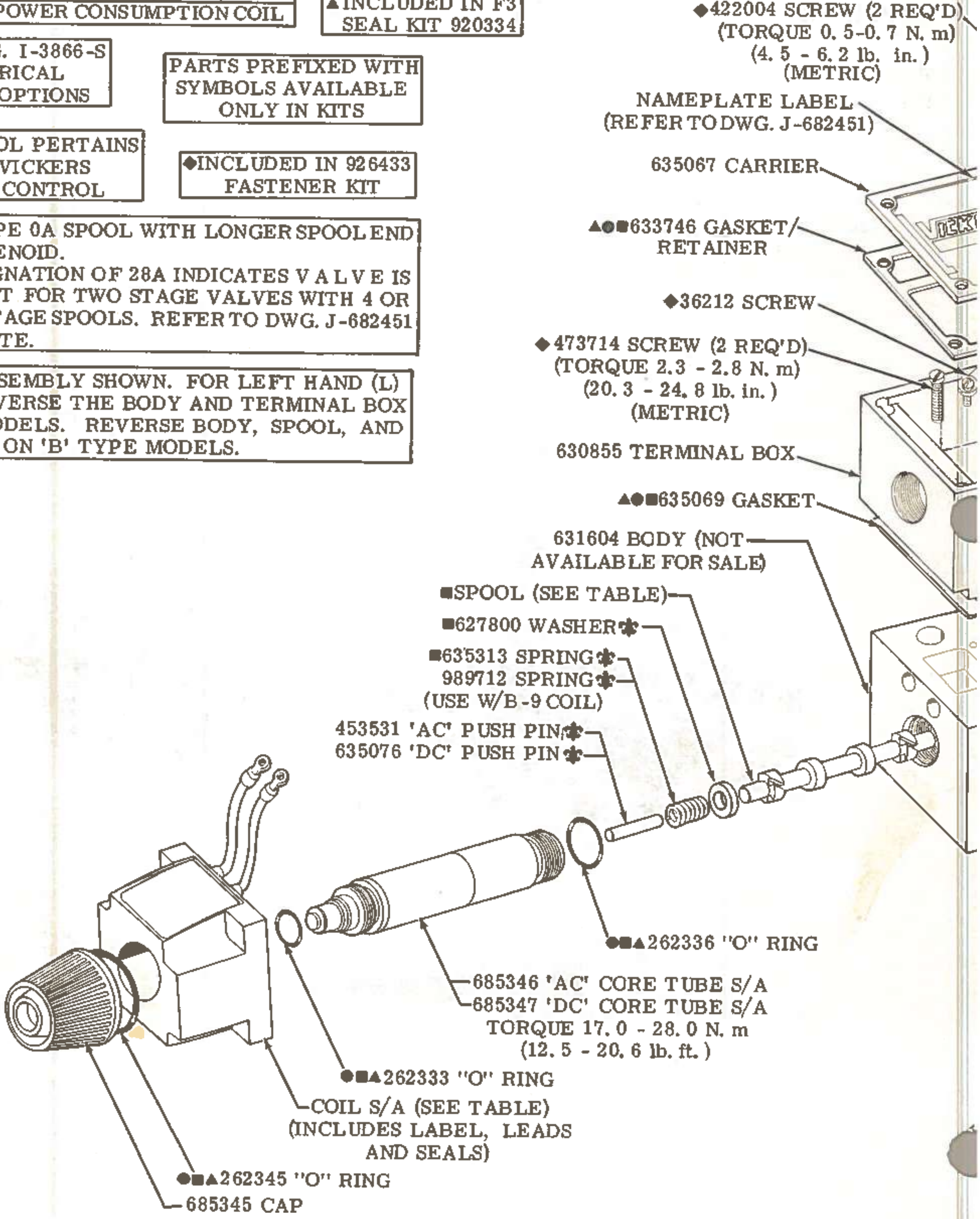
PARTS PREFIXED WITH SYMBOLS AVAILABLE ONLY IN KITS

⚜SUFFIX SYMBOL PERTAINS ONLY TO VICKERS MATERIAL CONTROL

◆INCLUDED IN 926433 FASTENER KIT

-ASSEMBLE TYPE 0A SPOOL WITH LONGER SPOOL END TOWARDS SOLENOID.
-A SPOOL DESIGNATION OF 28A INDICATES VALVE IS USED AS A PILOT FOR TWO STAGE VALVES WITH 4 OR 8 TYPE MAIN STAGE SPOOLS. REFER TO DWG. J-682451 FOR NAMEPLATE.

RIGHT HAND ASSEMBLY SHOWN. FOR LEFT HAND (L) ASSEMBLY, REVERSE THE BODY AND TERMINAL BOX ON 'A' TYPE MODELS. REVERSE BODY, SPOOL, AND TERMINAL BOX ON 'B' TYPE MODELS.



VICKERS®
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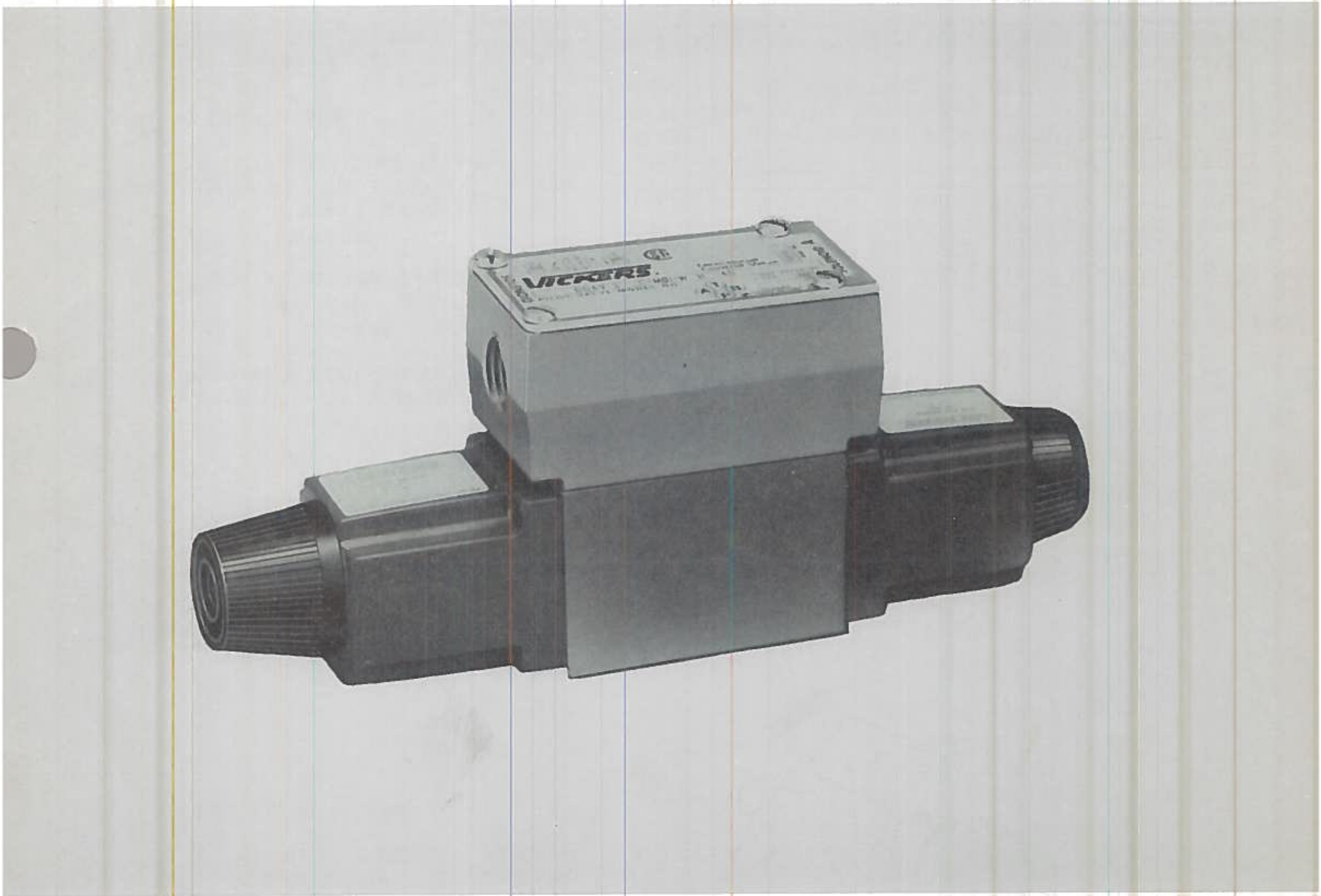
Service Parts Information

Directional Valve With Monitor Switch

DG4V-3-*(*)*(L)-MS(*)-**-*-40



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Released 9-1-85 **I-3859-S**

126

MODEL CODE BREAKDOWN

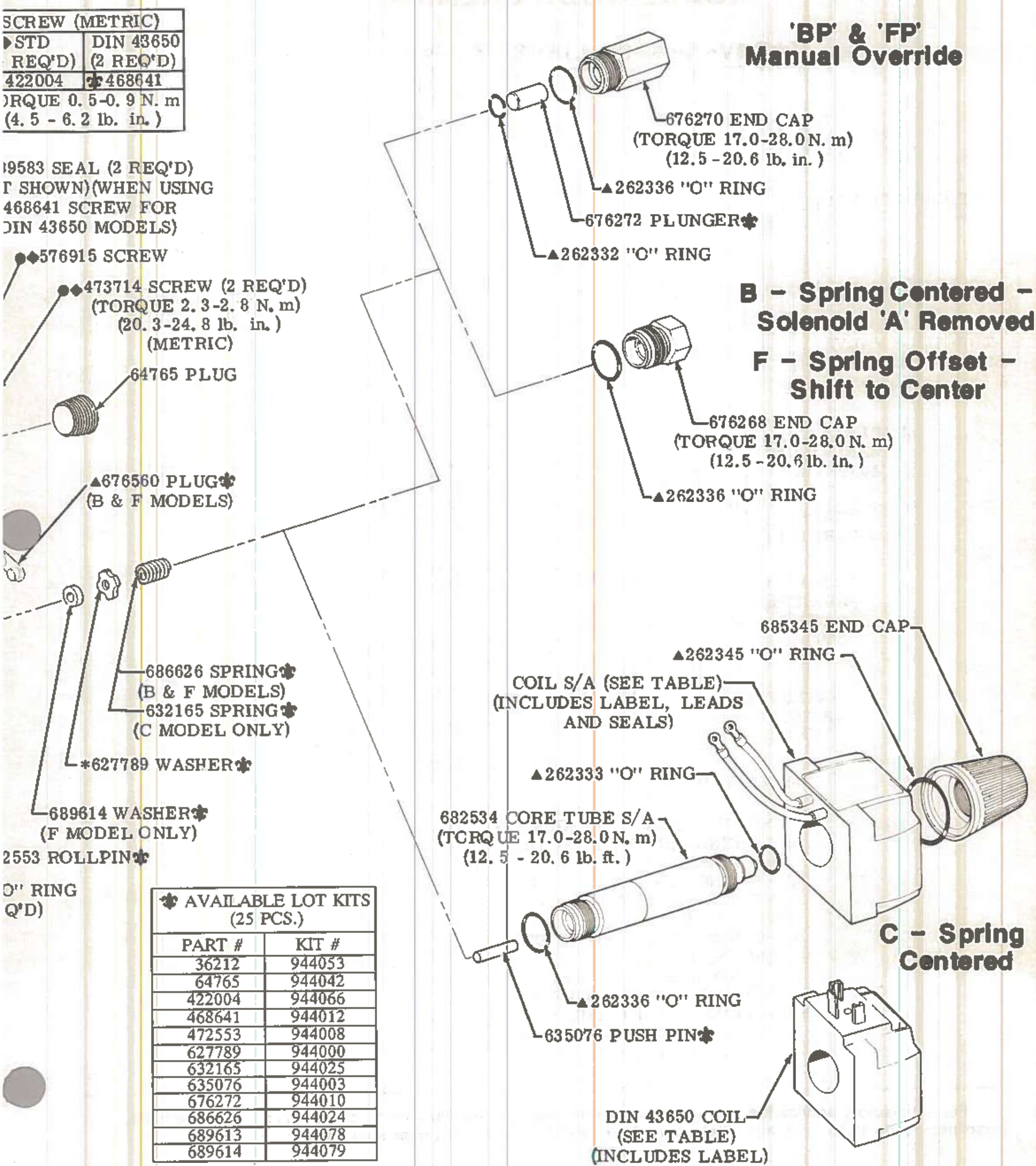
K*G4V-3-(P)(L)**S-M-(P**)-*-*-40**

- **K** — PROPORTIONAL TYPE
- ***** — D - DIRECTIONAL VALVE (DOUBLE SOLENOID 'C' MODELS ONLY)
  T - THROTTLE VALVE (SINGLE SOLENOID 'B' & 'F' MODELS ONLY)
- **G** — SUBPLATE OR MANIFOLD MOUNTED
- **4** — SOLENOID OPERATED
- **V** — MAXIMUM PRESSURE RATING 350 bar (5000 PSI)
- **3** — INTERFACE NFPA-D01/ ISO-4401-3
- ***** — SPOOL TYPE
- ***(P)** — SPOOL SPRING ARRANGEMENT
  - B - SPRING CENTERED, SINGLE SOLENOID
  - BP - SPRING CENTERED, SINGLE SOLENOID, MANUAL OPERATOR IN END CAP.
  - C - SPRING CENTERED, DOUBLE SOLENOID
  - F - SPRING OFFSET, SHIFT TO CENTER, SINGLE SOLENOID
  - FP - SPRING OFFSET, SHIFT TO CENTER, SINGLE SOLENOID, MANUAL OPERATOR IN END CAP
- **(L)** — L - LEFT HAND (SINGLE SOLENOID MODELS ONLY)
  OMIT - WHEN NOT REQ'D
- ****** — FLOW RATING L/Min. @ 10 bar
- **S** — SPOOL METERING
  S - STANDARD
- **M** — FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS
- **(P**)** — ELECTRICAL FEATURES & OPTIONS (REFER TO DRAWING I-3866-S)
- ***** — U - DIN 43650 COIL
  W - WIRING HOUSING ½ NPT THD.
- ***** — COIL CODE LETTER (SEE TABLE FOR VOLTAGE)
- **40** — DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

Litho in U. S. A.

K*G4V-3-**(P)(L)***-M-*-*-40



AVAILABLE LOT KITS (25 PCS.)

PART #	KIT #
36212	944053
64765	944042
422004	944066
468641	944012
472553	944008
627789	944000
632165	944025
635076	944003
676272	944010
686626	944024
689613	944078
689614	944079

DIN 43650 COIL S/A	COIL S/A	DC VOLT	COIL CODE
685352	686030	12	G
685353	686031	24	H

▲INCLUDED IN 920304 SEAL KIT

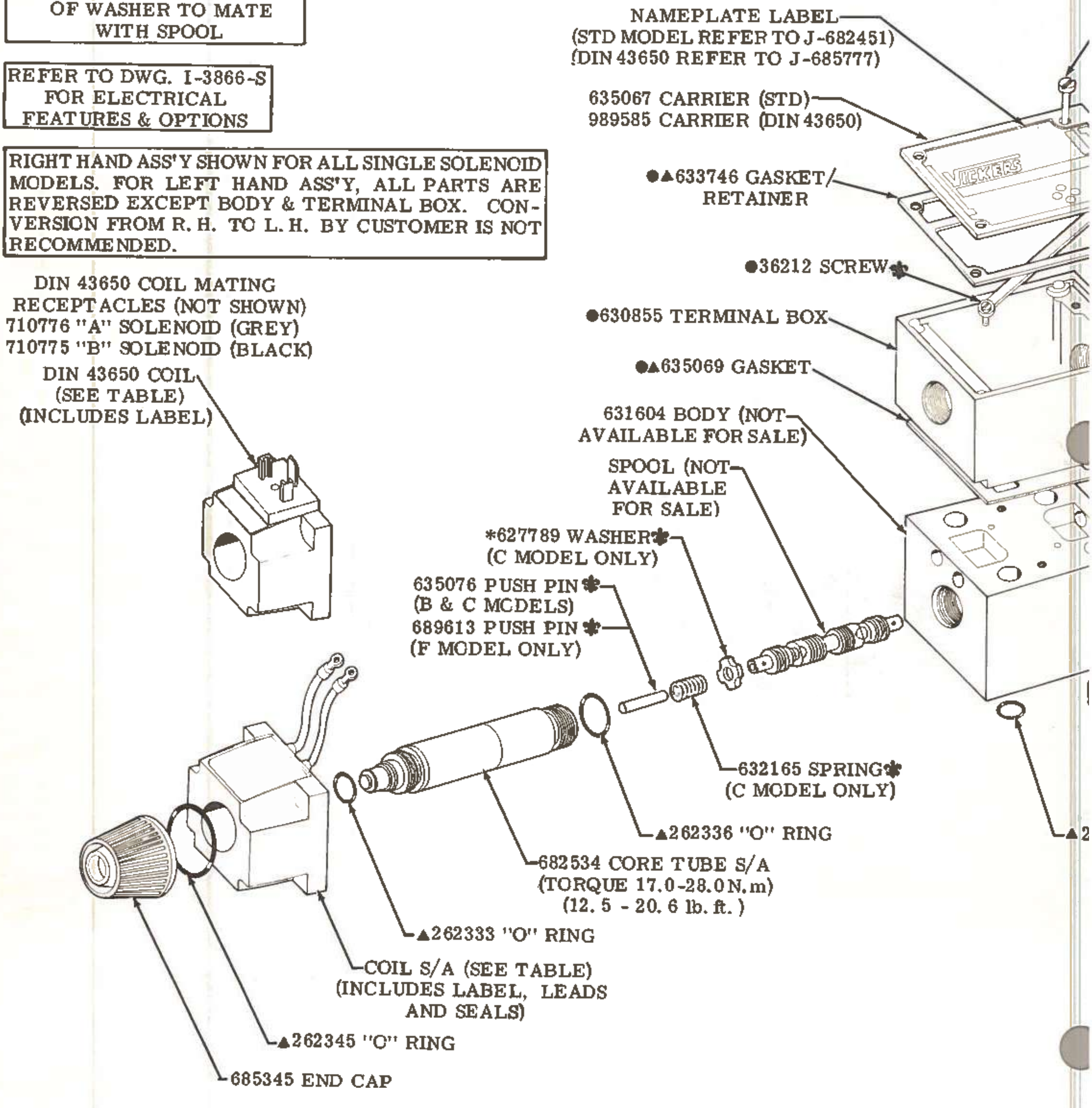
●OMIT WHEN USING MODELS WITH DIN 43650 COILS.

◆INCLUDED IN 926433 FASTENER KIT

*ASSEMBLE ROUNDED FACE OF WASHER TO MATE WITH SPOOL

REFER TO DWG. I-3866-S FOR ELECTRICAL FEATURES & OPTIONS

RIGHT HAND ASS'Y SHOWN FOR ALL SINGLE SOLENOID MODELS. FOR LEFT HAND ASS'Y, ALL PARTS ARE REVERSED EXCEPT BODY & TERMINAL BOX. CONVERSION FROM R. H. TO L. H. BY CUSTOMER IS NOT RECOMMENDED.

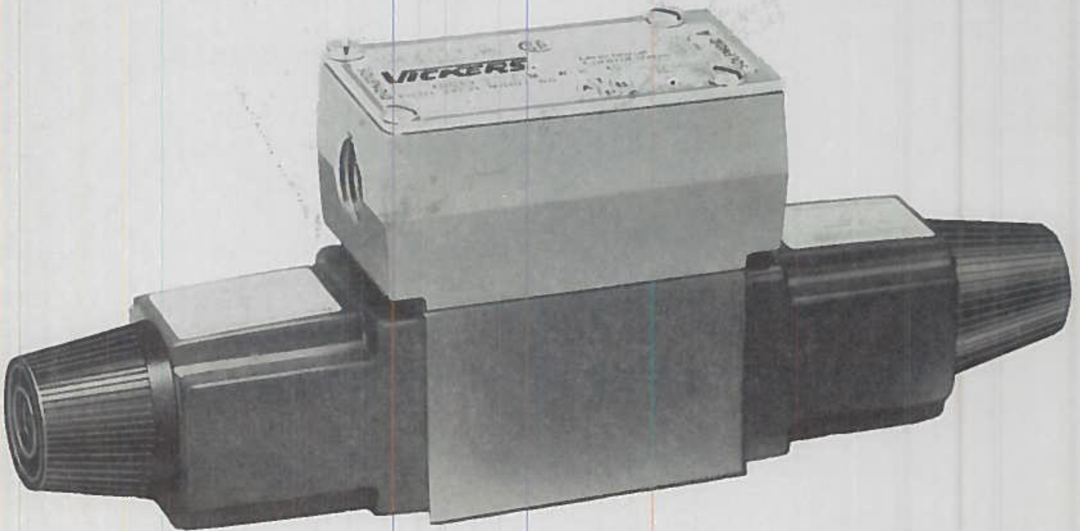


VICKERS®
A TRINOVA COMPANY

Service Parts Information

Proportional Type Directional Valve

KDG4V-3-* *(P)(L)* *S-M-(P* *)-*-*-40
KTG4V-3-* *(P)(L)* *S-M-(P* *)-*-*-40

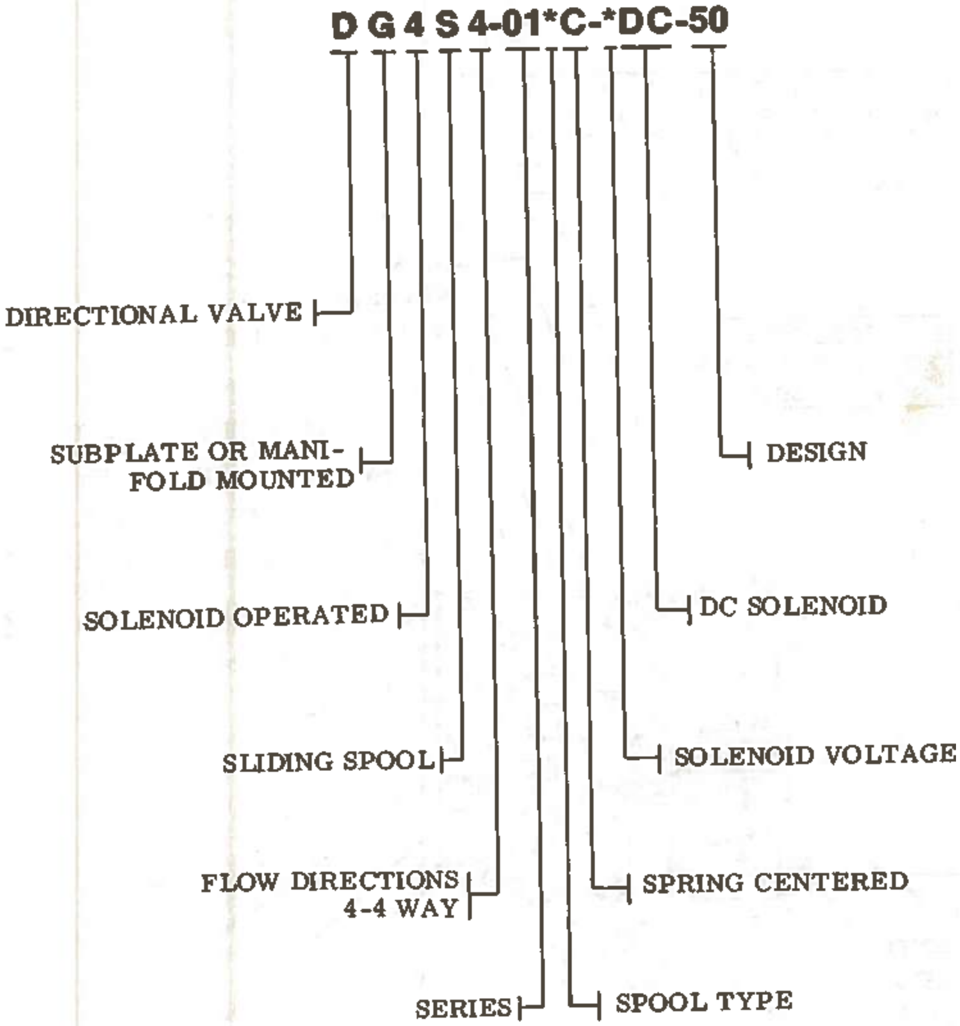


Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007–0302

Revised 12-1-87 **I-3860-S**

125

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

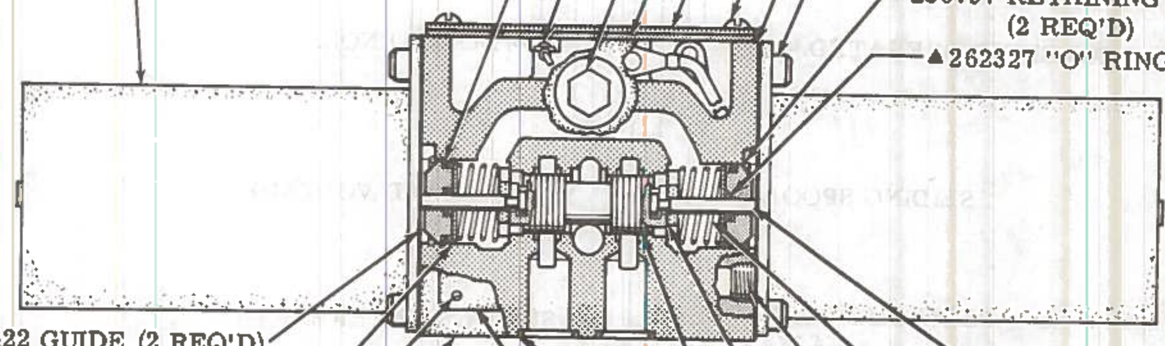
Service Parts Information

VICKERS
A TRINOVA COMPANY

SPRING CENTERED SOLENOID CONTROLLED DIRECTIONAL VALVES DG4S4-01*C-*DC-50

VOLTAGE	SOLENOID S/A (2 REQ'D)	COIL S/A (2 REQ'D)	SOLENOID S/A F3 (2 REQ'D)	COIL S/A F3 (2 REQ'D)
12 DC	290839	291583	751283	751284
24 DC	290840	291584	393091	393090

FOR ADDITIONAL SOLENOID S/A'S SEE I-3499-S



▲INCLUDED IN SEAL KIT 919359

MODEL	DIAGRAM PLATE	SPOOL	WASHER (2 REQ'D)	SPRING (2 REQ'D)	PUSH PIN (2 REQ'D)
DG4S4-010C-*DC-50	290341	213230	211846	290072	213268
DG4S4-012C-*DC-50	290343	213231			
DG4S4-013C-*DC-50	290344	239903			
DG4S4-016C-*DC-50	290345	213232			
DG4S4-017C-*DC-50	290346	236624			
DG4S4-018C-*DC-50	290340	235637	283637	217323	290264
DG4S4-0133C-*DC-50	577484	236615	211846	290072	213268

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Revised 11-1-85

MODEL CODE BREAKDOWN

X D*5 S 4 - * * *(X) (*)-(*)-(E)-(T)-(*)-(***AC**)-5***

- **X** — FOR USE IN HAZARDOUS AREA
- **D** — DIRECTIONAL VALVE
- ***** — F - FLANGE CONNECTION; G - SUBPLATE OR MANIFOLD MOUNTED.
- **5** — SOLENOID CONTROLLED PILOT OPERATED
- **S** — SLIDING SPOOL
- **4** — FLOW DIRECTIONS: 4-4 WAY
- ****** — 06-SERIES 60; 10-SERIES 100; 16-SERIES 160
- ***** — TYPE OF MAIN STAGE SPOOL
- ***** — A-SPRING OFFSET; C-SPRING CENTERED; D-PRESSURE CENTERED; N-NO SPRING DETENTED
- **(X)** — "X" - FAST RESPONSE MODELS (FOR 100 SERIES PRESSURE CENTERED MODELS, "X" IS AVAILABLE IN THE "A" PILOT PRESSURE RANGE ONLY); OMITTED - LOW SHOCK MODEL
- **(*)** — PILOT PRESSURE RANGE (100 SERIES PRESSURE CENTERED MODELS ONLY): OMITTED - 2000 TO 3000 PSI; A - 300 TO 1000 PSI; B - 1000 TO 2000 PSI
- **(*)** — SPOOL CONTROL MODIFICATIONS (OMIT IF NOT REQUIRED): 1-STROKE ADJUSTMENTS; 2-PILOT CHOKE; 3-PILOT CHOKE AND STROKE ADJUSTMENT; 7-STROKE ADJUSTMENT "A" END ONLY; 8-STROKE ADJUSTMENT "B" END ONLY
- **(E)** — E-EXTERNAL PILOT PRESSURE; OMITTED-INTERNAL PILOT PRESSURE
- **(T)** — T-INTERNAL PILOT DRAIN (NOT AVAILABLE ON OPEN CENTER SPOOLS UNLESS EXTERNAL PILOT PRESSURE (E) IS USED); OMITTED-EXTERNAL PILOT DRAIN
- **(*)** — CHECK VALVE: OMITTED-NOCHECK VALVE; K- 5 PSI CRACKING PRESSURE; L-30 PSI CRACKING PRESSURE; R-50 PSI CRACKING PRESSURE; S-75 PSI CRACKING PRESSURE
- **(***AC**)** — VOLTAGE AND FREQUENCY: OMITTED-115AC60 STANDARD.
- **-5*** — DESIGN: -50/-51/-53/-54

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

Service Parts Information

DIRECTIONAL VALVES FOR USE IN HAZARDOUS LOCATIONS XD*5S4-****-(*)(*)-(*)-(E)-(T)-(*)-5*

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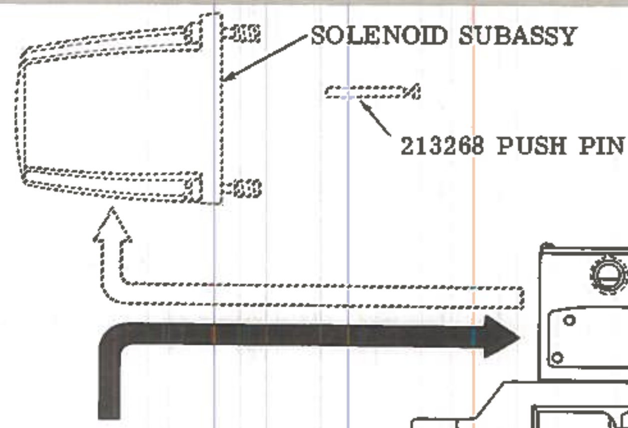
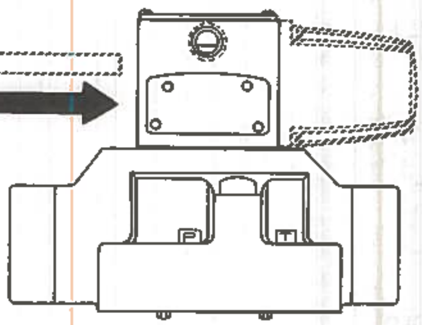
THESE PARTS



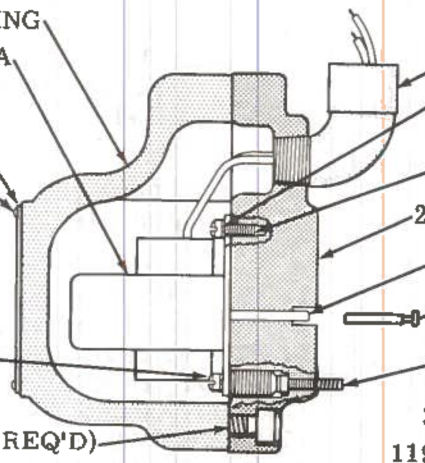
ARE REPLACED BY

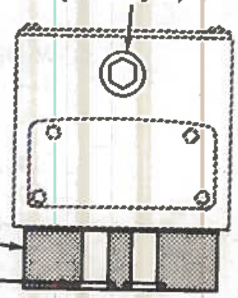


THE SAME CHANGE APPLIES TO THIS END FOR MODELS WITH TWO SOLENOIDS

VOLTAGE	SOLENOID S/A	COIL
115 AC 60	288564	142249
230 AC 60	288565	142251

THESE PARTS





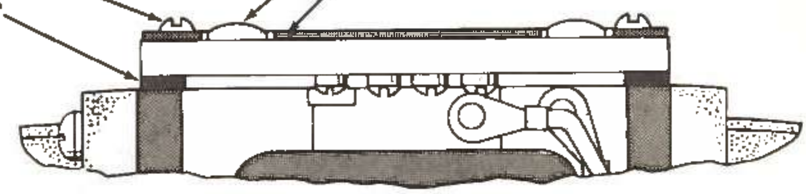
ON MODEL	SHOWN ON DRAWING -50	SHOWN ON DRAWING -51	SHOWN ON DRAWING -53/-54	TO MAKE MODEL
DF5S4-16*A-50/-53	I-3486-S			XDF5S4-16*A-*-50/-53
DF5S4-16*B-53	——	——	I-3622-S	XDF5S4-16*B-*-53
DF5S4-16*C-50/-53	I-3482-S			XDF5S4-16*C-*-50/-53
DF5S4-16*N-50/-51/-53	I-3482-S	I-3482-S		XDF5S4-16*N-*-50/-51/-53
DG5S4-06*A-50/-51	I-3492-S	I-3502-S		XDG5S4-06*A-*-50/-51
DG5S4-06*C-50/-51	I-3490-S	I-3473-S		XDG5S4-06*C-*-50/-51
DG5S4-06*D-50/-51	I-3493-S	I-3504-S	——	XDG5S4-06*D-*-50/-51
DG5S4-06*N-50/-51	I-3491-S	I-3474-S		XDG5S4-06*N-*-50/-51
DG5S4-10*A-50/-51/-53/-54	I-3496-S	I-3513-S		XDG5S4-10*A-*-50/-51/-53/-54
DG5S4-10*B-53/-54	——	——	I-3624-S	XDG5S4-10*B-*-53/-54
DG5S4-10*C-50/-51/-53/-54	I-3494-S	I-3509-S		XDG5S4-10*C-*-50/-51/-53/-54
DG5S4-10*D-50/-51/-53/-54	I-3497-S	I-3514-S	I-3625-S	XDG5S4-10*D-*-50/-51/-53/-54
DG5S4-10*N-50/-51/-53/-54	I-3495-S	I-3512-S	I-3624-S	XDG5S4-10*N-*-50/-51/-53/-54

MODEL CODE BREAKDOWN

F6-DG4S4*-01*A-W3-*-50

- F6 — HIGH WATER BASE FLUIDS
- D — DIRECTIONAL VALVE
- G — MANIFOLD OR SUBPLATE MOUNTED
- 4 — SOLENOID OPERATED
- S — SLIDING SPOOL
- 4 — FLOW DIRECTION 4 - 4 WAY
- * — SOLENOID INDICATOR LIGHTS
  L - LIGHT
  OMITTED - NONE
- 01 — SERIES
- * — SPOOL TYPE
- A — A - OFFSET
- W3 — W3 - WET ARMATURE SERVICEABLE CORE TUBE S/A
- * — COIL IDENTIFICATION LETTER
- 50 — DESIGN

FOR MODELS WITH
SOLENOID INDICATOR LIGHTS

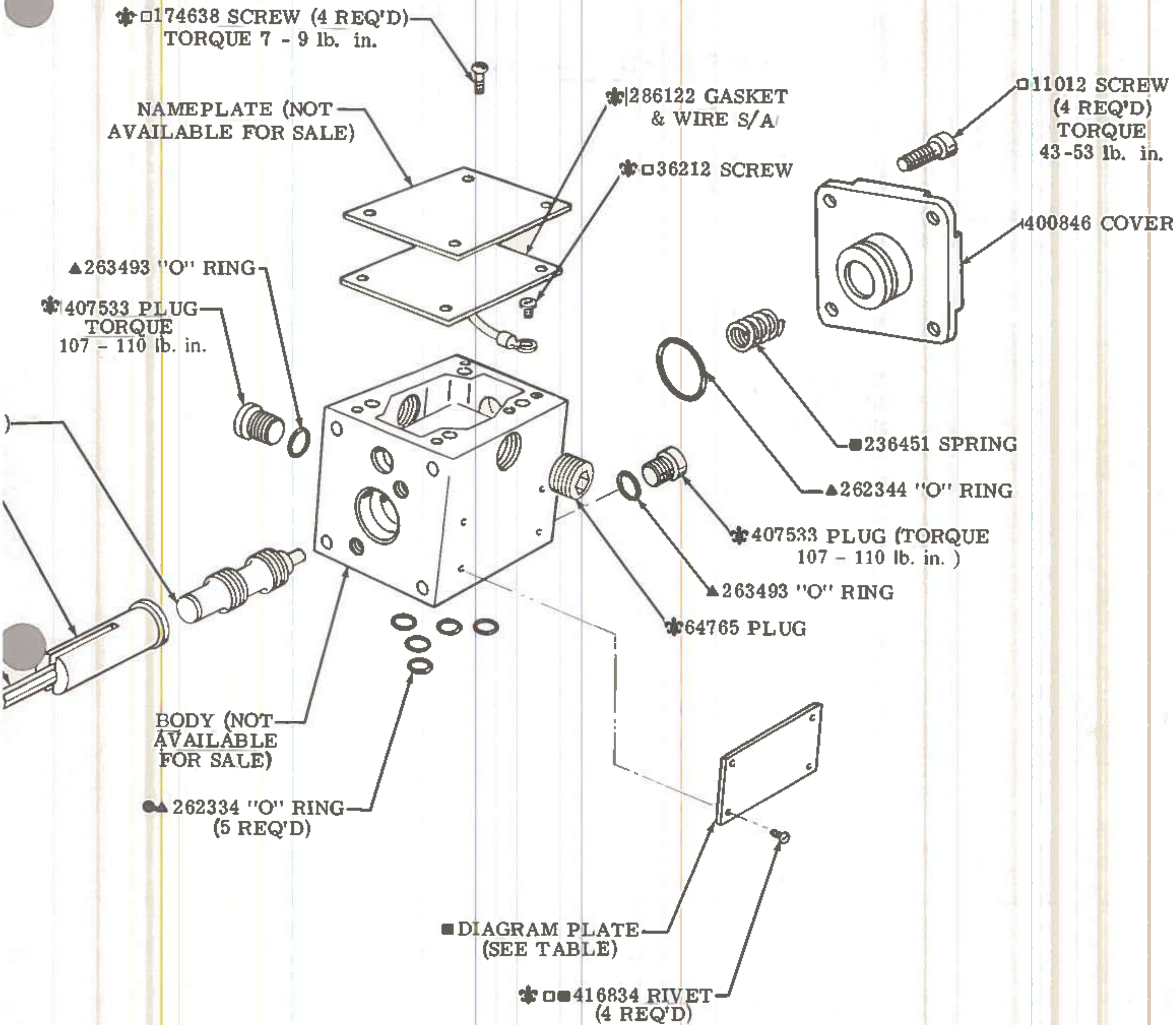


SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617

NOTE
REFER TO PARTS DRAWING I-3487-S
FOR MODELS WITH PLUG-IN FEATURE.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.



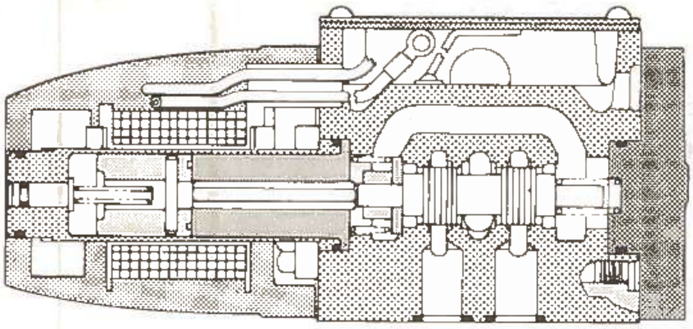
✾ LOT KITS (25 PCS. ONLY)	
PART #	KIT #
174638	944054
286122	944043
36212	944053
407533	944040
416834	944027
64765	944042
400809	926310

□INCLUDED IN FASTENER KIT 942465

▲INCLUDED IN F3 SEAL KIT 920109

⊖INCLUDED IN 941493 AC CORE TUBE KIT

⊖INCLUDED IN 941416 DC CORE TUBE KIT



NOTE
PART NUMBERS PREFIXED WITH A SYMBOL ARE AVAILABLE ONLY AS SERVICE KITS.

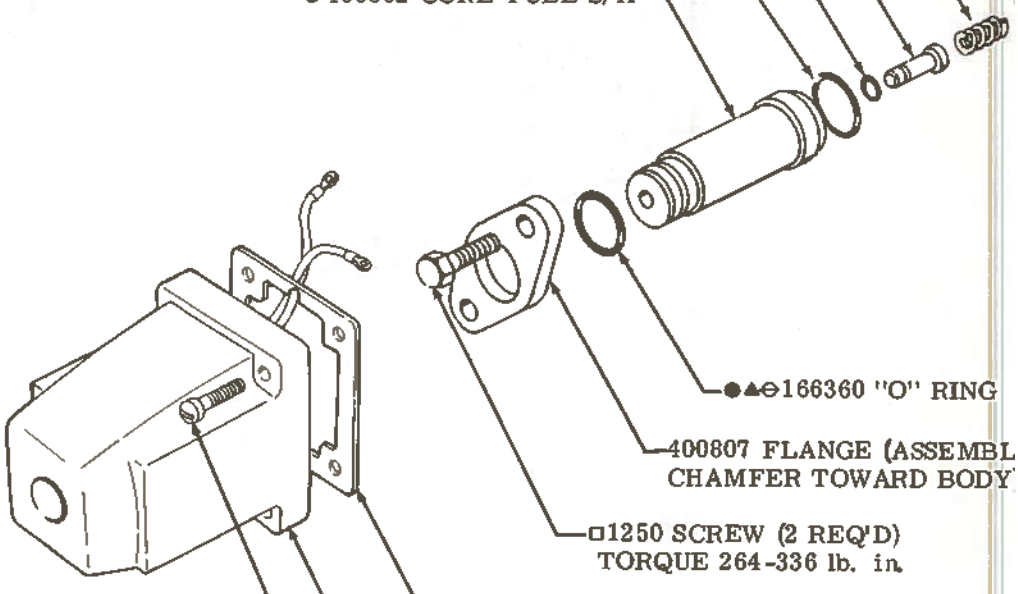
NOTE
RIGHT HAND ASSEMBLY SHOWN. FOR LEFT H
ASSEMBLY ALL PARTS, EXCEPT BODY, ARE
VERSED. EXAMPLE OF LEFT HAND MODEL
F6-DG4S4-012A-W3-*-50-LH.

MODEL	SPOOL	DIAGRAM PLATE	SPOOL KIT
F6-DG4S4-010A-W3-*-50	572287	290348	940703
F6-DG4S4-010A-W3-*-50LH		577490	941011
F6-DG4S4-012A-W3-*-50	463426	290348	940704
F6-DG4S4-012A-W3-*-50LH		577490	941012
F6-DG4S4-016A-W3-*-50	572288	290348	740705
F6-DG4S4-016A-W3-*-50LH		577490	941013

SPOOL KIT INCLUDES SPOOL, DIAGRAM PLATE, SEAL KIT, AND PARTS PREFIXED WITH A CLOSED SQUARE SYMBOL (■).

●INCLUDED IN COIL KIT

●COIL S/A	COIL KIT	MODEL	COIL CODE
400823	942466	110/50, 115/60, 120/60	B
400824	942467	220/50, 230/60	D
400825	942468	440/50, 460/60	M
435755	941017	127/50	EG



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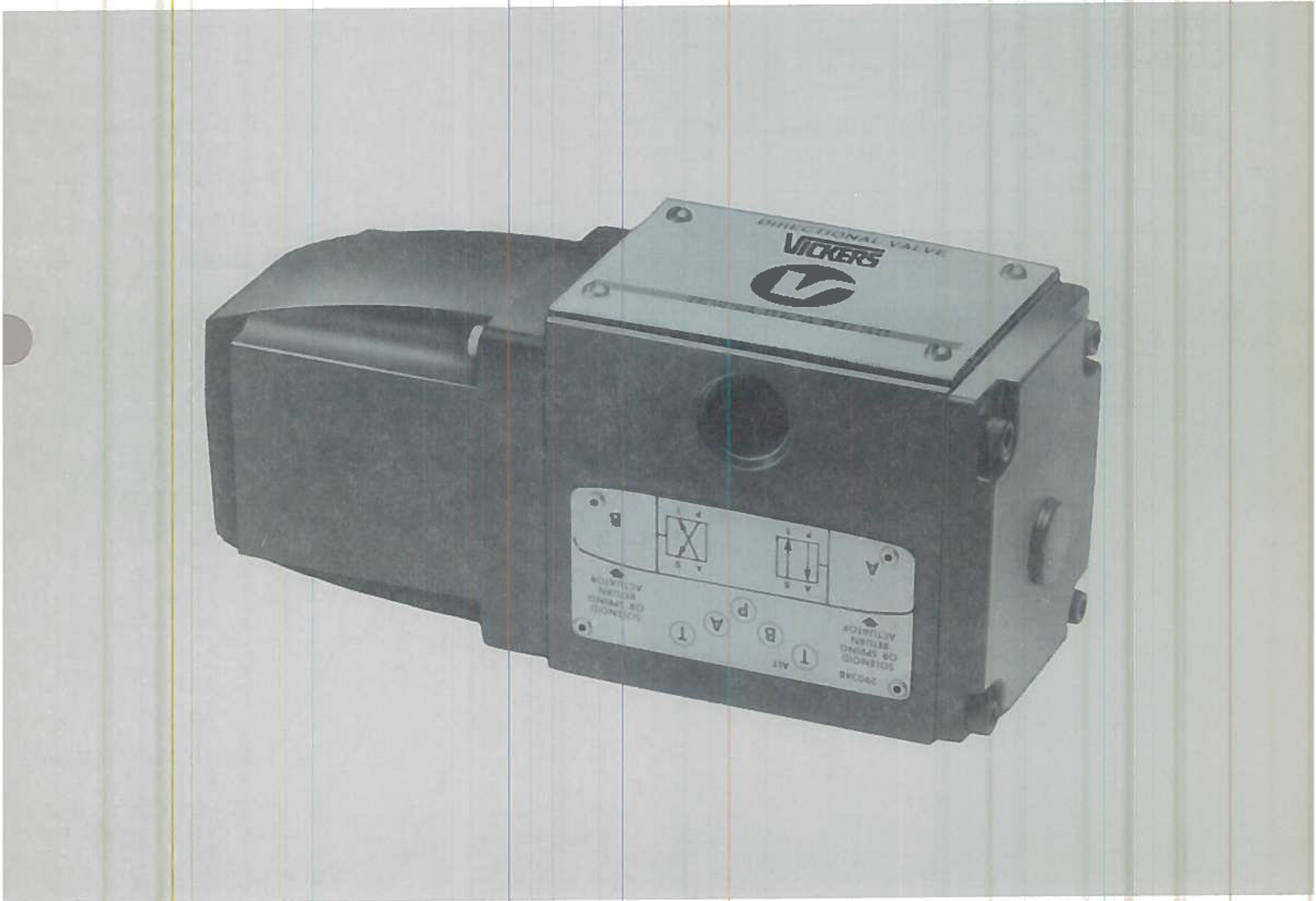
Service Parts Information

Wet Armature Solenoid Operated Directional Valves

F6-DG4S4-01*A-W3-*-50



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Revised 5-1-87

I-3641-S

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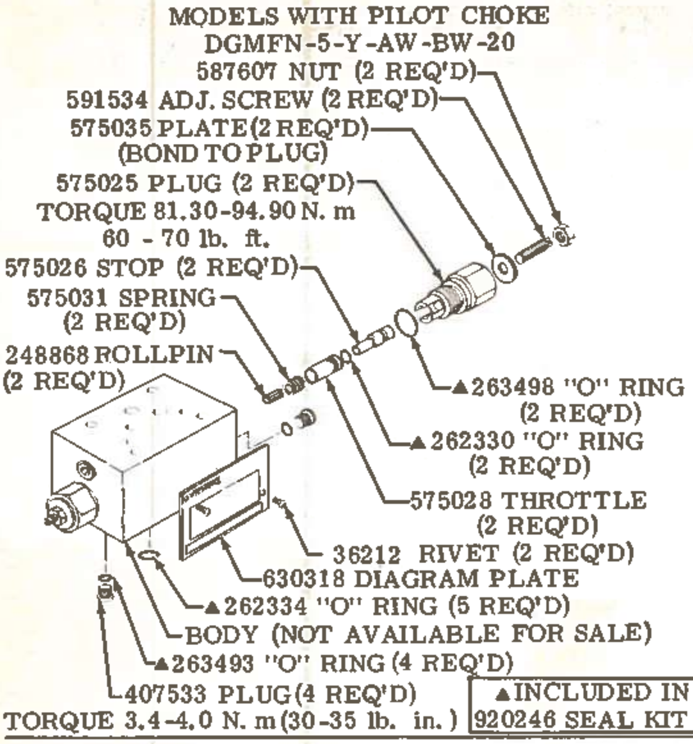
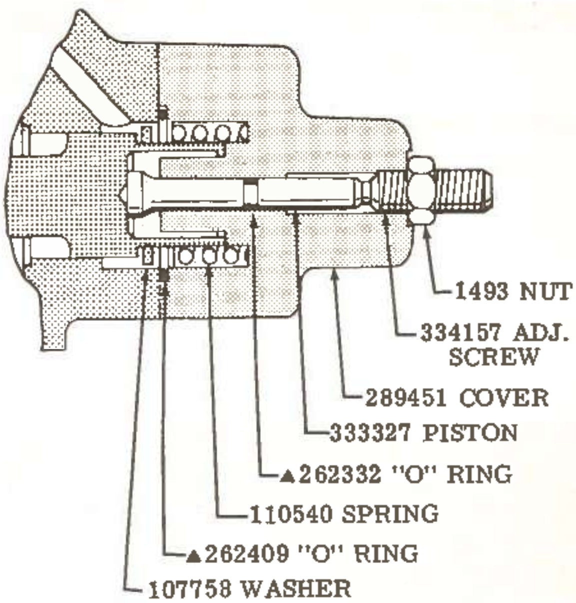


▲INCLUDED IN 920246 SEAL KIT

STROKE ADJUSTMENT PARTS



MODEL CODE BREAKDOWN

(F3) (P)-D G 5 S 4 (L)-10 * D (*)(X)(**)-(E)- W(3)-(*)-53**

- (F3) — MULTI-FLUID CAPABILITY (VITON SEALS)
- (P**) — ELECTRICAL PLUG FEATURE (SEE NOTE BELOW)
- D — DIRECTIONAL VALVE
- G — SUBPLATE OR MANIFOLD MOUNTED
- 5 — SOLENOID CONTROLLED PILOT OPERATED
- S — SLIDING SPOOL
- 4 — FLOW DIRECTIONS
  4 - 4 WAY
- (L) — L - SOLENOID INDICATOR LIGHTS
  OMITTED - NONE
- 10 — 1.25 INCH SERIES 100
- * — TYPE OF MAIN STAGE SPOOL
- D — PRESSURE CENTERED
- (*) — PILOT PRESSURE RANGE
  A - 300 TO 1000 PSI (20.0 - 70.0 bar)
  B - 1000 TO 2000 PSI (70.0 - 138.0 bar)
  OMITTED - 2000 TO 3000 PSI (138.0 - 207.0 bar)
- (X) — "X" - FAST RESPONSE MODEL (AVAILABLE ONLY FOR "A" PILOT PRESS RANGE)
  OMITTED - LOW SHOCK MODEL
- (**) — SPOOL CONTROL MODIFICATION (OMIT WHEN NOT REQUIRED)
  2 - PILOT CHOKE ADJUSTMENT
  8 - STROKE ADJ. CYLINDER "B" END ONLY
  2-8 - IF BOTH ARE REQUIRED
- (E) — E - EXTERNAL PILOT PRESS
  OMITTED - INTERNAL PILOT PRESSURE
- W(3) — W - NON SERVICEABLE CORE TUBE
  W3 - SERVICEABLE CORE TUBE
- (*) — COIL IDENT. LETTER
- 53 — DESIGN

ELECTRICAL PLUG FEATURE (OMIT IF NOT REQUIRED)

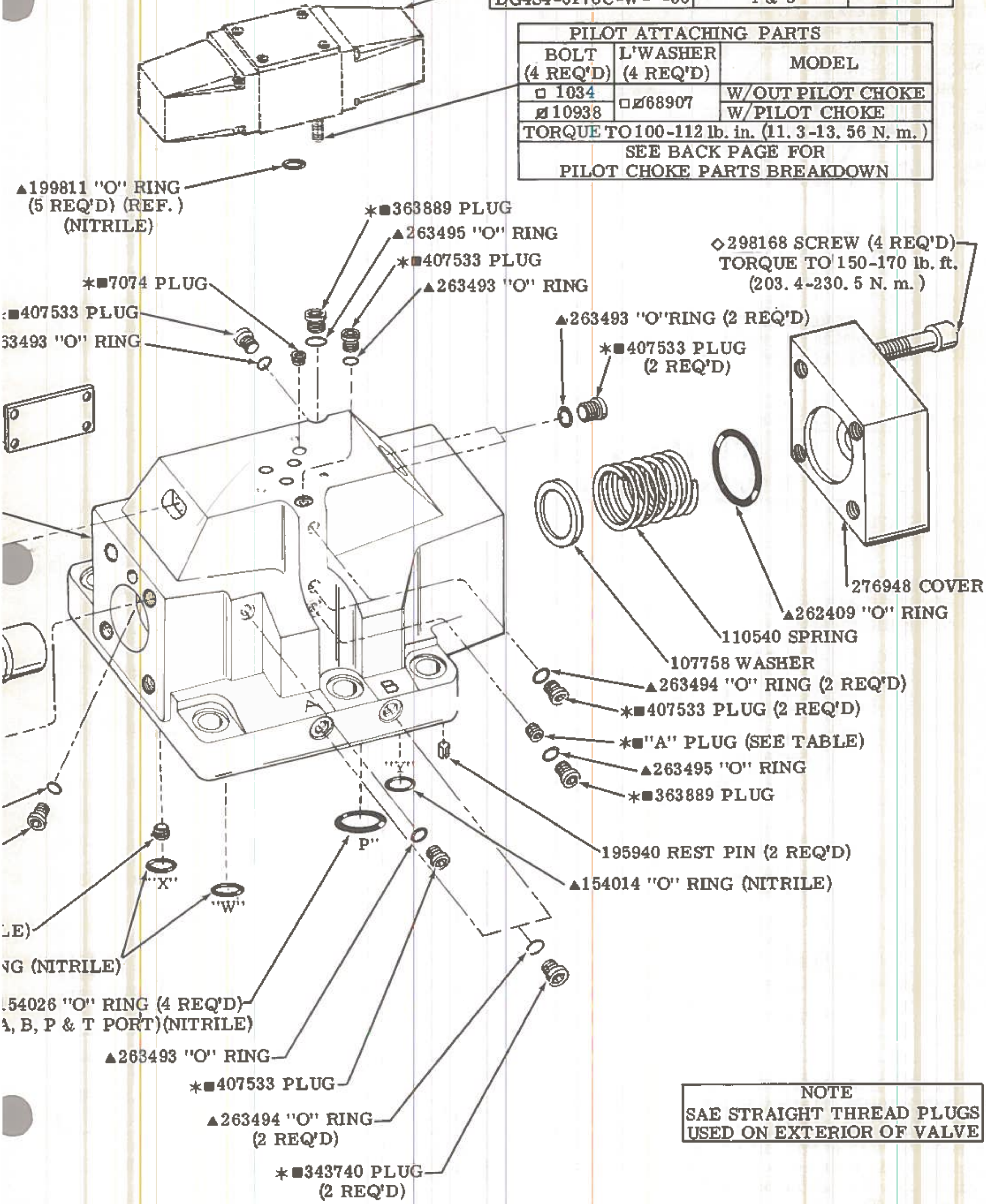
PA - INSTA-PLUG, MALE RECEPTACLE ONLY PB - INSTA-PLUG, MALE & FEMALE RECEPTACLE	PA3 (3 PIN) & PA5 (5 PIN) RECEPTABLES THAT MEET NFPA HYDRAULIC VALVE ELECTRICAL STANDARD T3.5.29M-1980.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

MODEL	MAIN STAGE SPOOL TYPE	REFER TO DRAWING
DG4S4-017C-W-*-50	0, 1, 2, 3, 6, 9 & 33	I-3558-S
DG4S4-0178C-W-*-50	4 & 8	

PILOT ATTACHING PARTS		
BOLT (4 REQ'D)	L'WASHER (4 REQ'D)	MODEL
□ 1034	□ø68907	W/OUT PILOT CHOKE
ø 10938		W/PILOT CHOKE
TORQUE TO 100-112 lb. in. (11.3-13.56 N. m.)		
SEE BACK PAGE FOR PILOT CHOKE PARTS BREAKDOWN		



NOTE
SAE STRAIGHT THREAD PLUGS USED ON EXTERIOR OF VALVE

MODEL	SPOOL	I. D. PLATE WITH CIRCUIT DIAGRAM
DG5S4-100D-53	364037	400967
DG5S4-101D-53	*331404	400968
DG5S4-102D-53	364038	400969
DG5S4-103D-53	*277479	400970
DG5S4-104D-53	281193	400971
DG5S4-106D-53	364039	400972
DG5S4-108D-53	364041	400971
DG5S4-109D-53	277563	400967
DG5S4-1033D-53	364042	400972

*ASSEMBLE TYPE 1 & 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END IS DEFINED AS BEING CLOSEST TO CYLINDER PORT "A".

PLUG INSTALLATION TABLE

MODEL	PLUG "A"	PLUG "B"
-10*D-53	226987	OUT
-10*D-E-53	7074	226987
-10*DA-53	30560	OUT
-10*DA-E-53	7074	30560
-10*DAX-53	OUT	OUT
-10*DAX-E-53	7074	
-10*DB-53	224026	
-10*DB-E-53	7074	224026

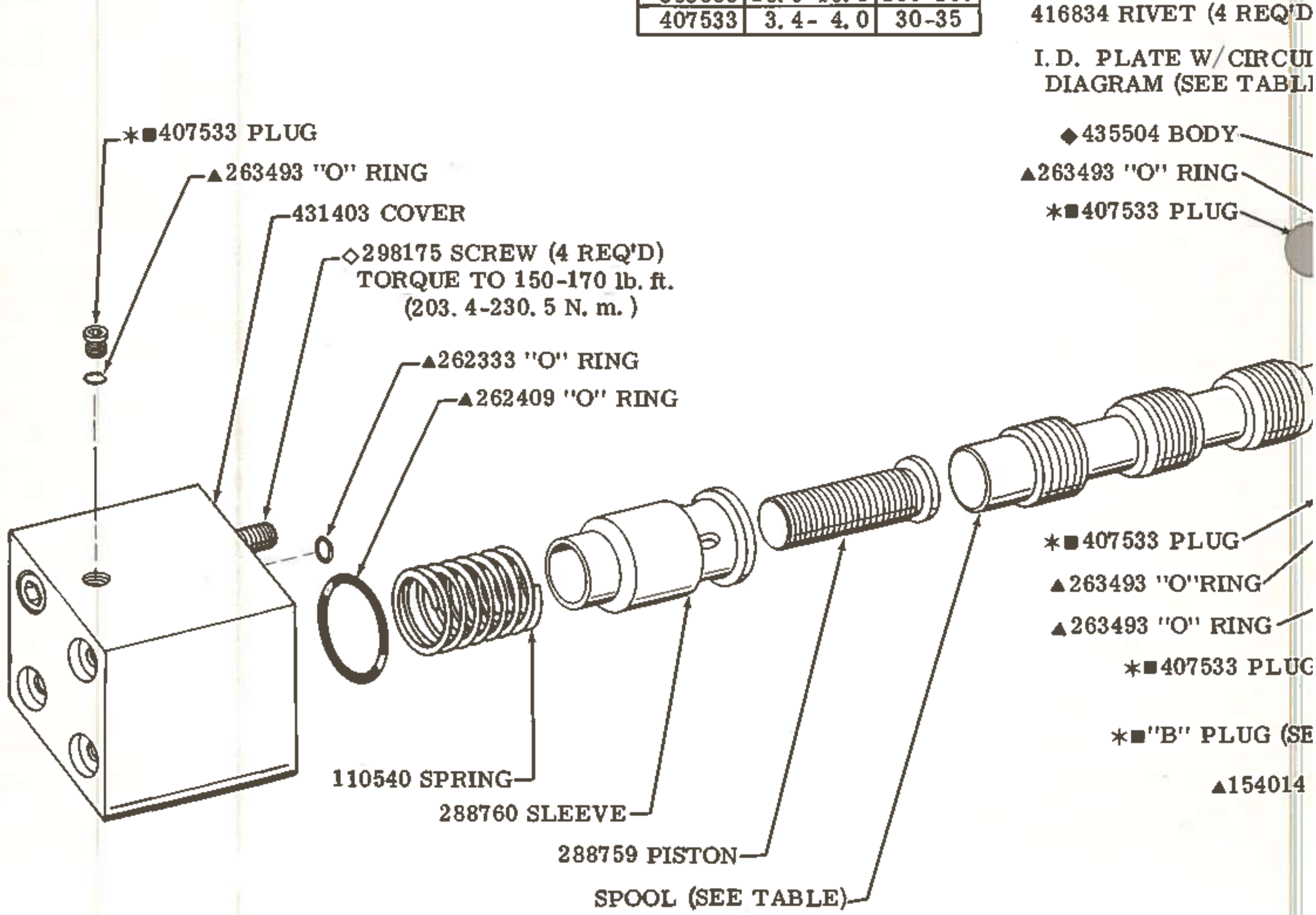
7074 NPTF PIPE PLUG. OTHERS ARE NPTF ORIFICE PLUGS.

SEAL KIT NOTE

The -53 design valves are manufactured as shown with F3 seals used internally. Interface seals are standard Nitrile material and are converted to F3 in the seal kit. All seals in the seal kit are F3.

■PLUG TORQUES (OILED)

PLUG	N. m	lb. in.
7074	8. 5- 9. 6	75-85
7075	20. 0-23. 0	180-205
30560	8. 5- 9. 6	75-85
224026	8. 5- 9. 6	75-85
226987	8. 5- 9. 6	75-85
343740	10. 0-11. 8	90-105
363889	16. 9-18. 0	150-160
407533	3. 4- 4. 0	30-35



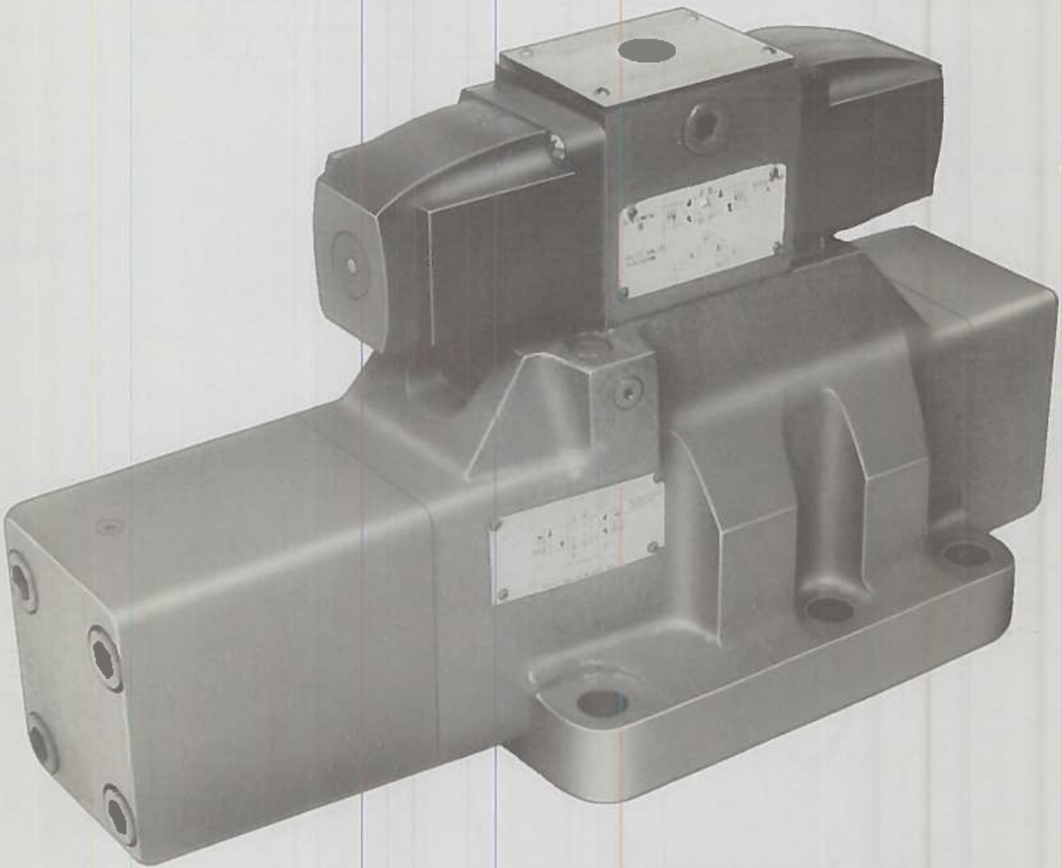
▲INCLUDED IN F3 SEAL KIT 920213
◇INCLUDED IN FASTENER KIT 941262
□INCLUDED IN BOLT KIT 255633
⌀INCLUDED IN BOLT KIT 255654
*INCLUDED IN PLUG KIT 941263
■PLUG TORQUES SEE TABLE
◆NOT AVAILABLE FOR SALE

NOTE
PARTS INCLUDED IN SERVICE KITS NOT SOLD SEPARATELY

Service Parts Information

DG5S4(L)-10*D(X)-W-*-53

Wet Armature Pressure Centered Solenoid Controlled Pilot Operated Directional Control Valves



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I-3628-S

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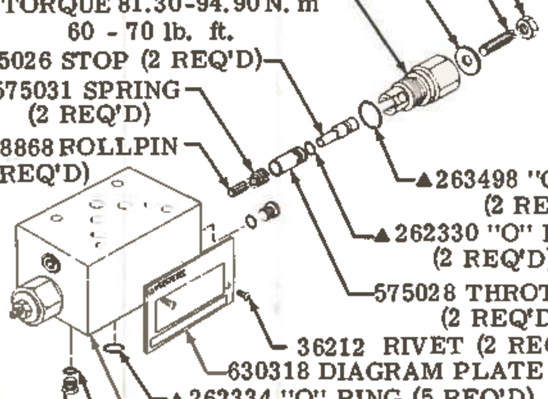
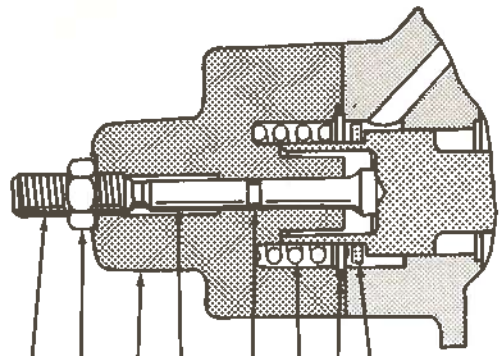
MODELS WITH PILOT CHOKE
DGMFN-5-Y-AW-BW-20



STROKE ADJUSTMENT PARTS



MODEL CODE BREAKDOWN

(F3)-(P) DG5S4(L)-10**(X)(*)-(E)-(T)(*)-W(3)*-53-(LH)**

- (F3) – MULTI-FLUID CAPABILITY (VITON SEALS)
- (P**) – ELECTRICAL PLUG FEATURE (SEE NOTE BELOW)
- D – DIRECTIONAL VALVE
- G – SUBPLATE OR MANIFOLD MOUNTED
- 5 – SOLENOID CONTROLLED PILOT OPERATED
- S – SLIDING SPOOL
- 4 – FLOW DIRECTIONS: 4 - 4 WAY
- (L) – L - SOLENOID INDICATOR LIGHTS; OMITTED - NONE
- 10 – 1.25 INCH SERIES 100
- * – TYPE OF MAIN STAGE SPOOL
- * – VALVE TYPE
  - A - SPRING OFFSET
  - B - SPRING CENTERED (ONE SOLENOID)
  - C - SPRING CENTERED
  - N - NO SPRING DETENTED
- (X) – X - FAST RESPONSE MODEL; OMITTED - LOW SHOCK MODEL
- (*) – SPOOL CONTROL MODIFICATIONS (OMIT IF NOT REQUIRED)
  - 1 - STROKE ADJUSTMENTS
  - 2 - PILOT CHOKE ADJS.
  - 3 - PILOT CHOKE & STROKE ADJS.
  - 7 - STROKE ADJ. "A" END ONLY
  - 8 - STROKE ADJ. "B" END ONLY
- (E) – E - EXTERNAL PILOT PRESSURE; OMITTED - INTERNAL PILOT PRESS.
- (T) – T - INTERNAL PILOT DRAIN; OMITTED - EXTERNAL PILOT DRAIN
- (*) – CHECK VALVE
  - OMITTED - NO CHECK VALVE
  - K - 5 PSI (0.35 bar)
  - L - 30 PSI (2.14 bar)
  - R - 50 PSI (3.45 bar)
  - S - 75 PSI (5.2 bar)
- W(3) – W - NON SERVICEABLE CORE TUBE IN PILOT; W3 - SERVICEABLE CORE TUBE IN PILOT
- * – COIL IDENT. LETTER
- 53 – DESIGN
- (LH) – LEFT HAND ASSEMBLY

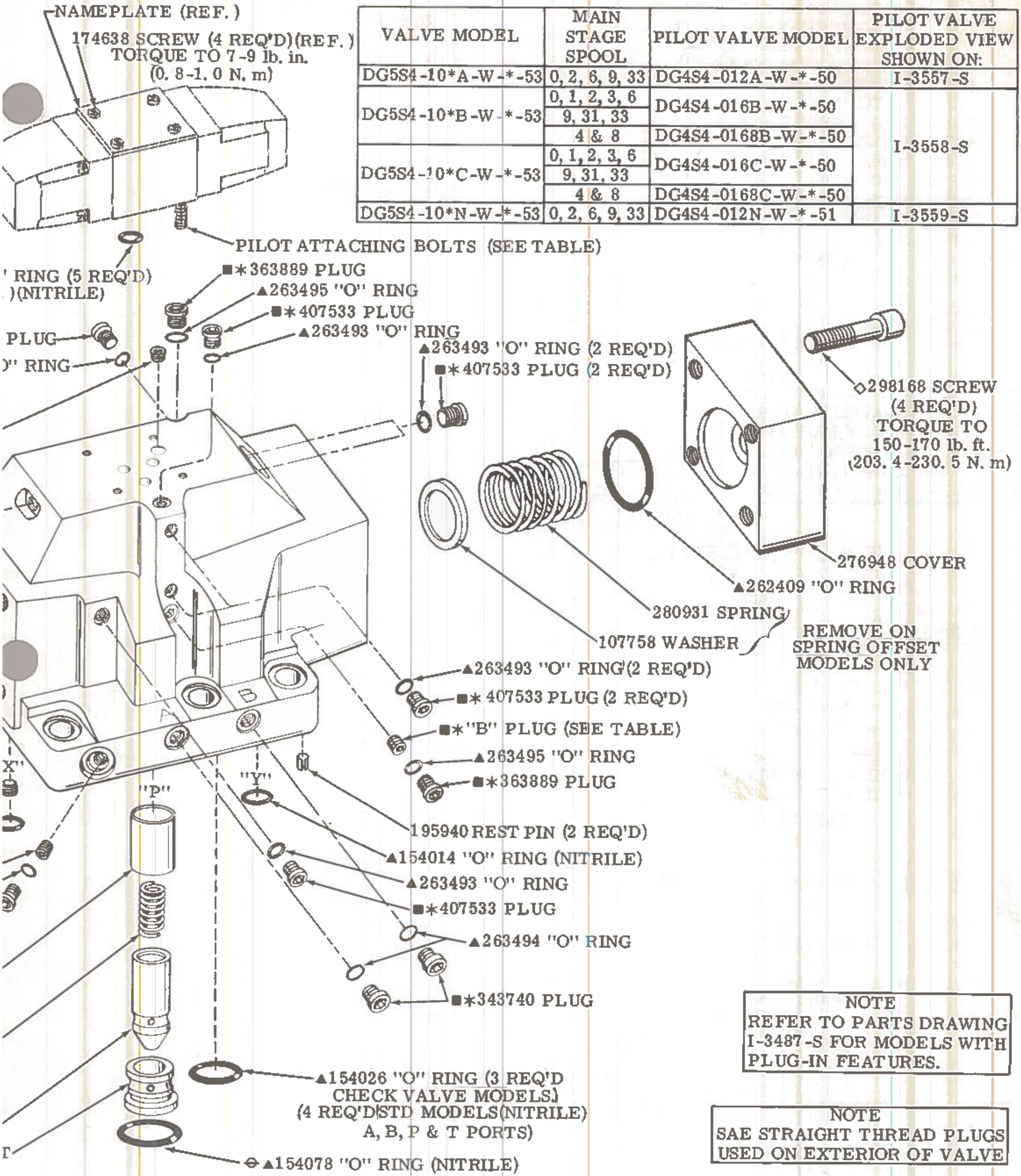
ELECTRICAL PLUG FEATURE (OMIT IF NOT REQUIRED)

PA - INSTA-PLUG, MALE RECEPTACLE ONLY PB - INSTA-PLUG, MALE & FEMALE RECEPTACLE	PA3 (3 PIN) & PA5 (5 PIN) RECEPTABLES THAT MEET NFPA HYDRAULIC VALVE ELECTRICAL STANDARD T3.5.29M-1980.

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

VALVE MODEL	MAIN STAGE SPOOL	PILOT VALVE MODEL	PILOT VALVE EXPLODED VIEW SHOWN ON:
DG5S4-10*A-W-*-53	0, 2, 6, 9, 33	DG4S4-012A-W-*-50	I-3557-S
DG5S4-10*B-W-*-53	0, 1, 2, 3, 6	DG4S4-016B-W-*-50	I-3558-S
	9, 31, 33		
	4 & 8	DG4S4-0168B-W-*-50	
DG5S4-10*C-W-*-53	0, 1, 2, 3, 6	DG4S4-016C-W-*-50	
	9, 31, 33		
	4 & 8	DG4S4-0168C-W-*-50	
DG5S4-10*N-W-*-53	0, 2, 6, 9, 33	DG4S4-012N-W-*-51	I-3559-S



NOTE
REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURES.

NOTE
SAE STRAIGHT THREAD PLUGS USED ON EXTERIOR OF VALVE

SEAL KIT NOTE
The -53 design valves are manufactured as shown with F3 seals used internally. Interface seals are standard Nitrile material and are converted to F3 in the seal kit. All seals in the seal kit are F3.

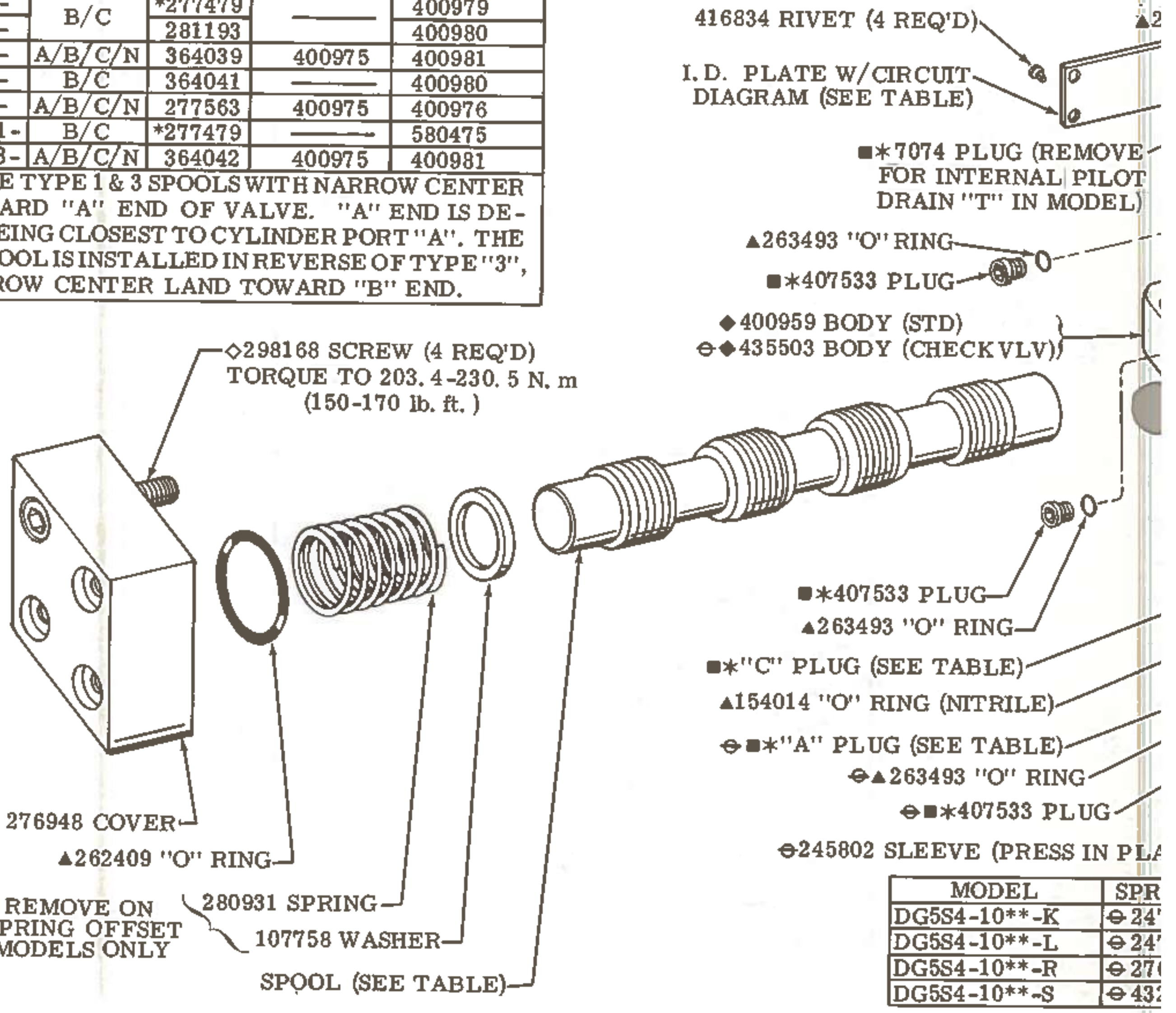
PLUG INSTALLATION TABLE			
MODEL	PLUG "A"	PLUG "B"	PLUG "C"
DG5S4-10**	DOES NOT EXIST	30560	OUT
DG5S4-10**-E		7074	30560
DG5S4-10**-X		OUT	OUT
DG5S4-10**-X-E		7074	
DG5S4-10**-K/L/R/S	161809		30560
DG5S4-10**-E-K/L/R/S	113000		
DG5S4-10**-X-K/L/R/S	OUT		OUT
DG5S4-10**-X-E-K/L/R/S	113000		

■PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
7074	8. 5- 9. 6	75-85
7075	20. 0-23. 0	180-205
30560	8. 5- 9. 6	75-85
113000	5. 0- 5. 9	45-52
161809	5. 0- 5. 9	45-52
343740	10. 0-11. 8	90-105
363889	16. 9-18. 0	150-160
407533	3. 4- 4. 0	30-35

VALVE MODEL CODE			MAIN STAGE ID PLATE W/CIRCUIT DIAGRAM	
MODEL	VALVE TYPE	SPOOL	A	B, C, N
DG5S4-100-	A/B/C/N	364037	400975	400976
DG5S4-101-	B/C	*331404	————	400977
DG5S4-102-	A/B/C/N	364038	400975	400978
DG5S4-103-	B/C	*277479	————	400979
DG5S4-104-		281193		400980
DG5S4-106-	A/B/C/N	364039	400975	400981
DG5S4-108-	B/C	364041	————	400980
DG5S4-109-	A/B/C/N	277563	400975	400976
DG5S4-1031-	B/C	*277479	————	580475
DG5S4-1033-	A/B/C/N	364042	400975	400981

* ASSEMBLE TYPE 1 & 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END IS DEFINED AS BEING CLOSEST TO CYLINDER PORT "A". THE TYPE 31 SPOOL IS INSTALLED IN REVERSE OF TYPE "3", WITH NARROW CENTER LAND TOWARD "B" END.

PILOT ATTACHING PARTS		
MODEL	BOLT (4 REQ'D)	L'WASHER (4 REQ'D)
W/OUT PILOT CHOKE	□ 1034	⌀□68907
W/PILOT CHOKE (SEE BACK PAGE)	⌀10938	
TORQUE TO 100-112 lb. in. 11. 3-12. 65 N. m.		



MODEL	SPR
DG5S4-10**-K	⊖24
DG5S4-10**-L	⊖24
DG5S4-10**-R	⊖27
DG5S4-10**-S	⊖43

⊖6422 PC

⊖2891

△▲INCLUDED IN F3 SEAL KIT 920213
◇INCLUDED IN FASTENER KIT 941262
□INCLUDED IN BOLT KIT 255633
⌀INCLUDED IN BOLT KIT 255654
*INCLUDED IN PLUG KIT 941263
■PLUG TORQUES (SEE TABLE)
◆NOT AVAILABLE FOR SALE
⊖USED ON CHECK VALVE MODELS ONLY

NOTE
PARTS INCLUDED IN SERVICE KITS WILL NOT BE SOLD SEPARATELY.

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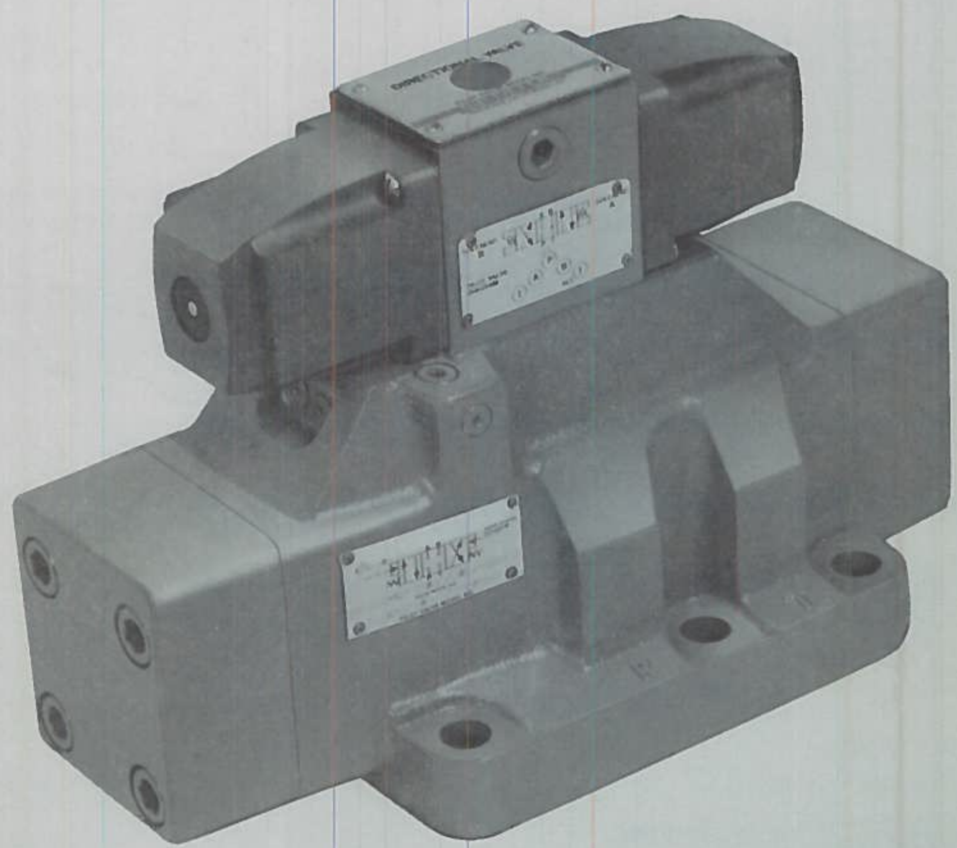
Service Parts Information

Wet Armature Pilot Operated Solenoid Controlled Directional Control Valves

DG5S4-10*A-W(3)-*-53
DG5S4-10*B-W(3)-*-53
DG5S4-10*C-W(3)-*-53
DG5S4-10*N-W(3)-*-53



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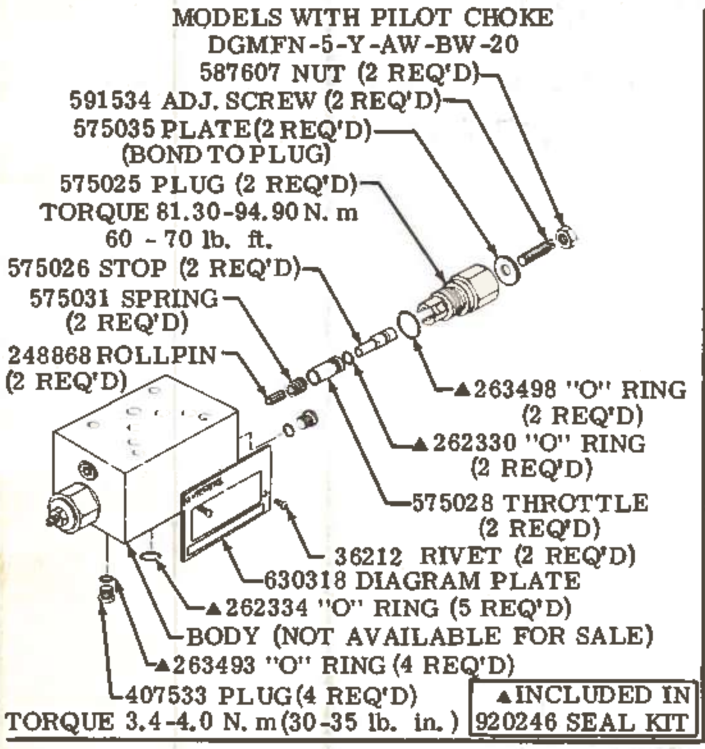
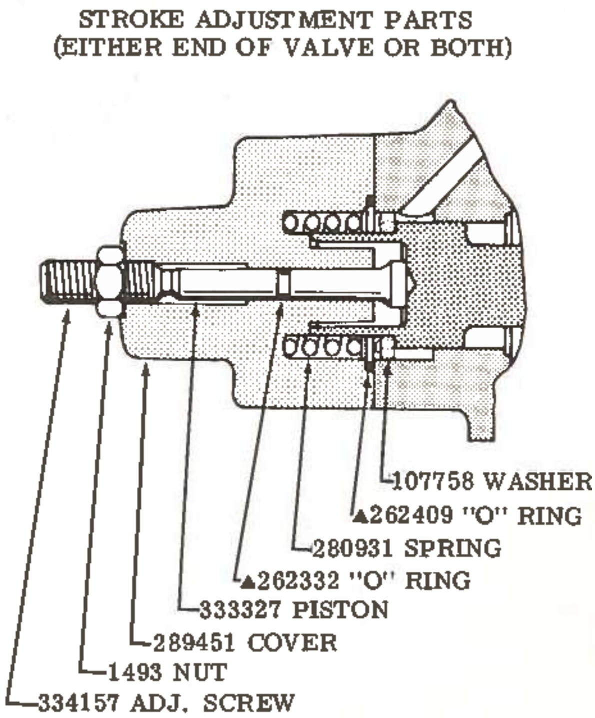




MODEL CODE BREAKDOWN

F3-D G 3 S 4 - 10 * (*) (X) - (*) - (*) - 53

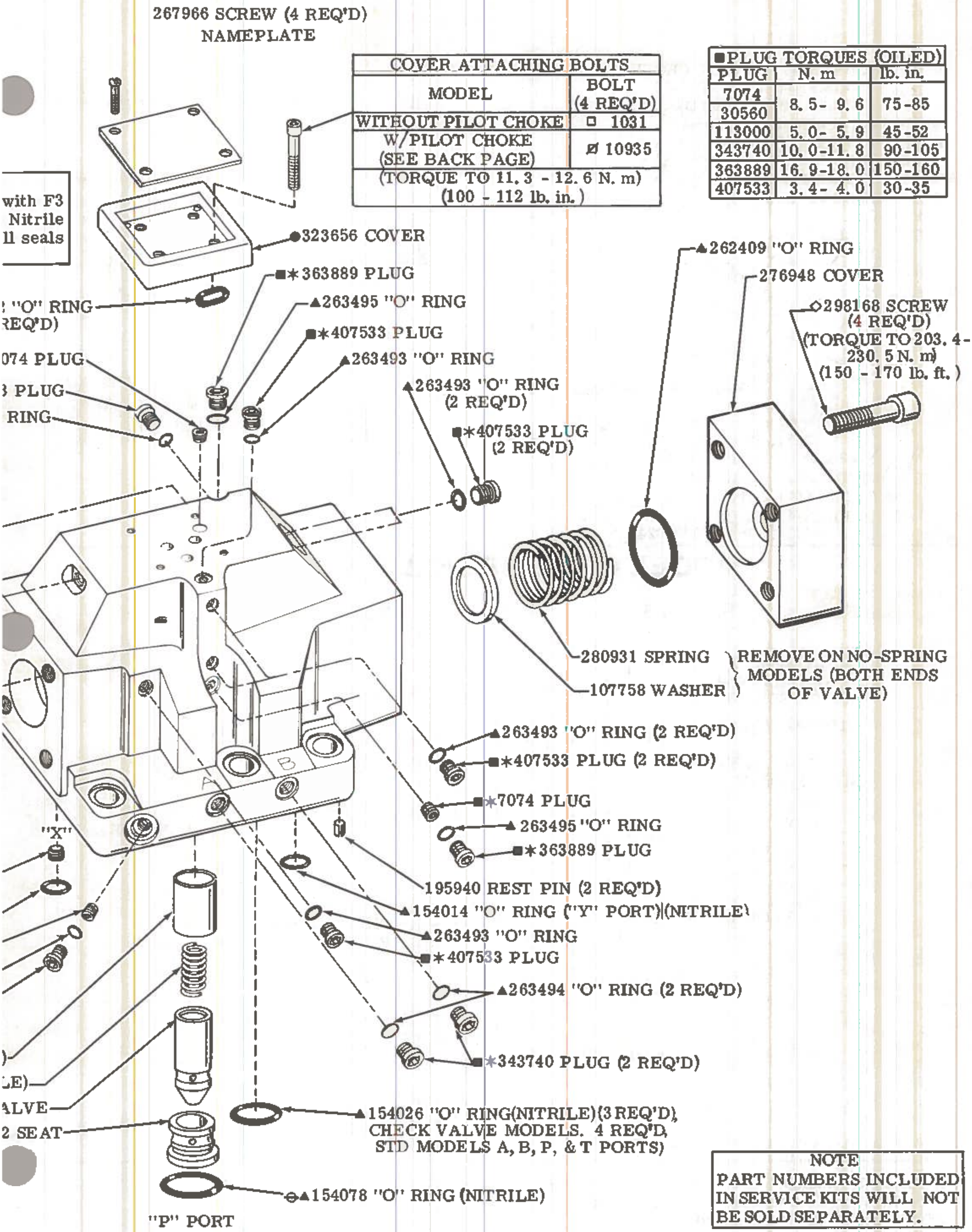
- F3 — MULTI-FLUID CAPABILITY (VITON SEALS)
- D — DIRECTIONAL VALVE
- G — SUBPLATE OR MANIFOLD MOUNTED
- 3 — PILOT OPERATED
- S — SLIDING SPOOL
- 4 — FLOW DIRECTIONS 4 - 4 WAY
- 10 — SERIES 100 (1.250 INCH)
- * — SPOOL TYPE
- (*) — C - SPRING CENTERED MODEL; OMITTED - NO-SPRING MODEL
- (X) — "X" - FAST RESPONSE MODEL; OMITTED - LOW SHOCK MODEL
- (*) — SPOOL CONTROL MODIFICATIONS (OMIT IF NOT REQUIRED)
  - 1 - STROKE ADJUSTMENTS
  - 2 - PILOT CHOKE ADJUSTMENTS
  - 3 - PILOT CHOKE & STROKE ADJS.
  - 4 - STROKE ADJ. "A" END ONLY
  - 5 - STROKE ADJ. "B" END ONLY
- (*) — CHECK VALVE (OMITTED — NO CHECK VALVE)
  - K- 5 PSI (0.35 bar) CRACKING PRESS.
  - L-35 PSI (2.4 bar) CRACKING PRESS.
  - R-50 PSI (3.45 bar) CRACKING PRESS.
  - S-75 PSI (5.2 bar) CRACKING PRESS.
- 53 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

COVER ATTACHING BOLTS	
MODEL	BOLT (4 REQ'D)
WITHOUT PILOT CHOKE	□ 1031
W/PILOT CHOKE (SEE BACK PAGE)	⌀ 10935
(TORQUE TO 11. 3 - 12. 6 N. m) (100 - 112 lb. in.)	

■PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
7074	8. 5 - 9. 6	75 - 85
30560		
113000	5. 0 - 5. 9	45 - 52
343740	10. 0 - 11. 8	90 - 105
363889	16. 9 - 18. 0	150 - 160
407533	3. 4 - 4. 0	30 - 35



NOTE
PART NUMBERS INCLUDED IN SERVICE KITS WILL NOT BE SOLD SEPARATELY.

MODEL	SPOOL	IDENTIFICATION PLATE (W/CIRCUIT DIAGRAM)	
		SPRING CTR	NO-SPRING
DG3S4-100(C)(X)-*-*-53	364037	400976	400975
DG3S4-101C(X)-*-*-53	*331404	400977	———
DG3S4-102(C)(X)-*-*-53	364038	400978	400975
DG3S4-103C(X)-*-*-53	*277479	400979	———
DG3S4-104C(X)-*-*-53	281193	400980	
DG3S4-106(C)(X)-*-*-53	364039	400981	400975
DG3S4-108C(X)-*-*-53	364041	400980	———
DG3S4-109(C)(X)-*-*-53	277563	400976	400975
DG3S4-1031C(X)-*-*-53	*277479	580475	———
DG3S4-1033C(X)-*-*-53	364042	400981	

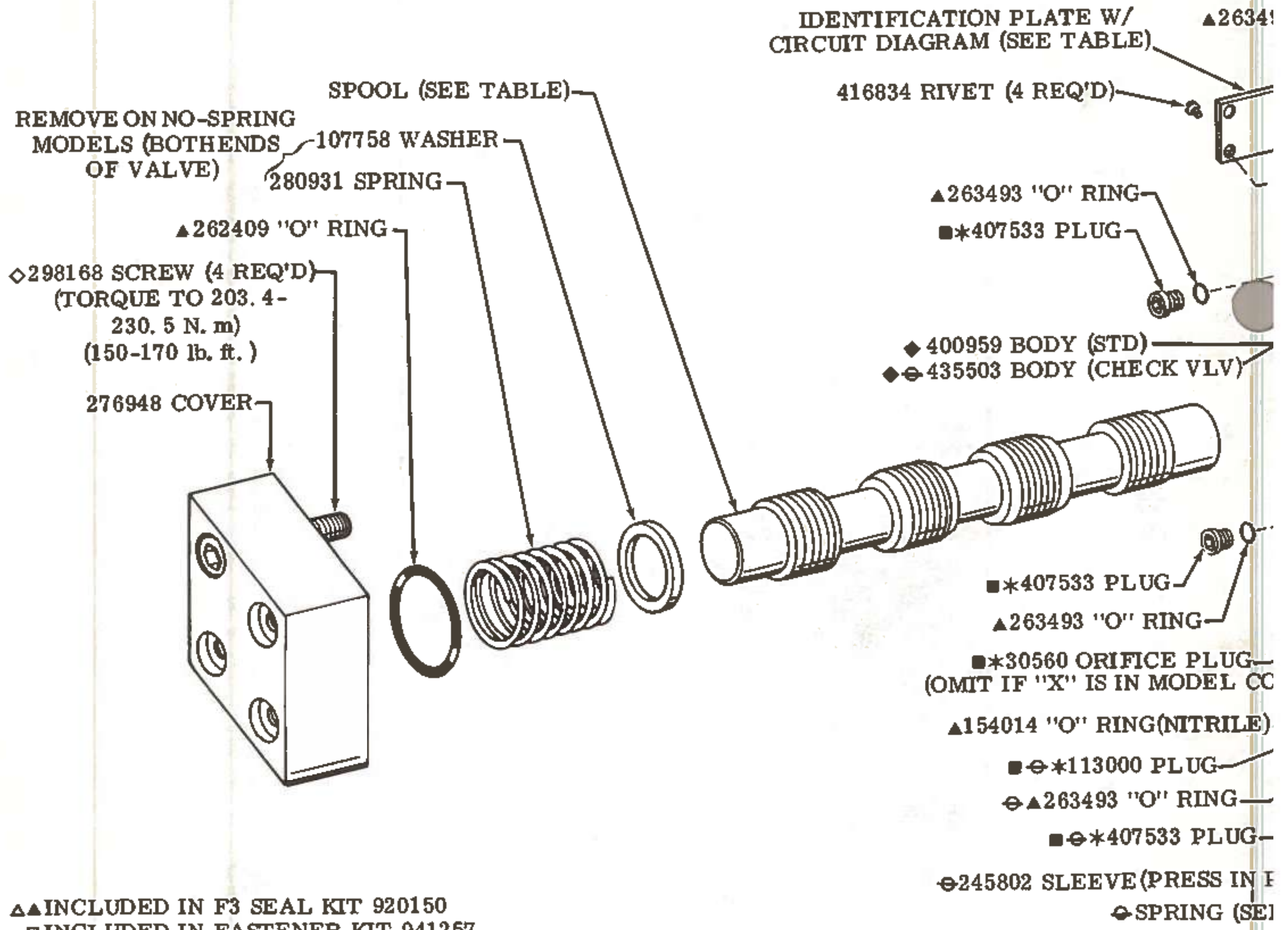
*SPOOL ASSEMBLY NOTE

Assemble type '1' and '3' spools with narrow center land toward "A" end of valve. "A" end of valve is defined as being closest to cylinder port "A". Type '31' spools are installed in reverse of type '3', with narrow center land toward "B" end of valve.

NOTE
SAE STRAIGHT THREAD PLUGS USED ON EXTERIOR OF VALVE

SEAL KIT NOTE

The -53 design valves are manufactured as s seals used internally. Interface seals are st material and are converted to F3 in the seal l in the seal kit are F3.



△▲INCLUDED IN F3 SEAL KIT 920150
□INCLUDED IN FASTENER KIT 941257
◇INCLUDED IN FASTENER KIT 941262
⌀INCLUDED IN BOLT KIT 255620
*INCLUDED IN PLUG KIT 941263
●INCLUDED IN COVER KIT 942024
⊖USED IN CHECK VALVE MODELS ONLY
■PLUG TORQUES (SEE TABLE)
◆NOT AVAILABLE FOR SALE

MODEL	SPRING
DG3S4-10*(C)-K-53	⊖247287
DG3S4-10*(C)-L-53	⊖247288
DG3S4-10*(C)-R-53	⊖276428
DG3S4-10*(C)-S-53	⊖432353

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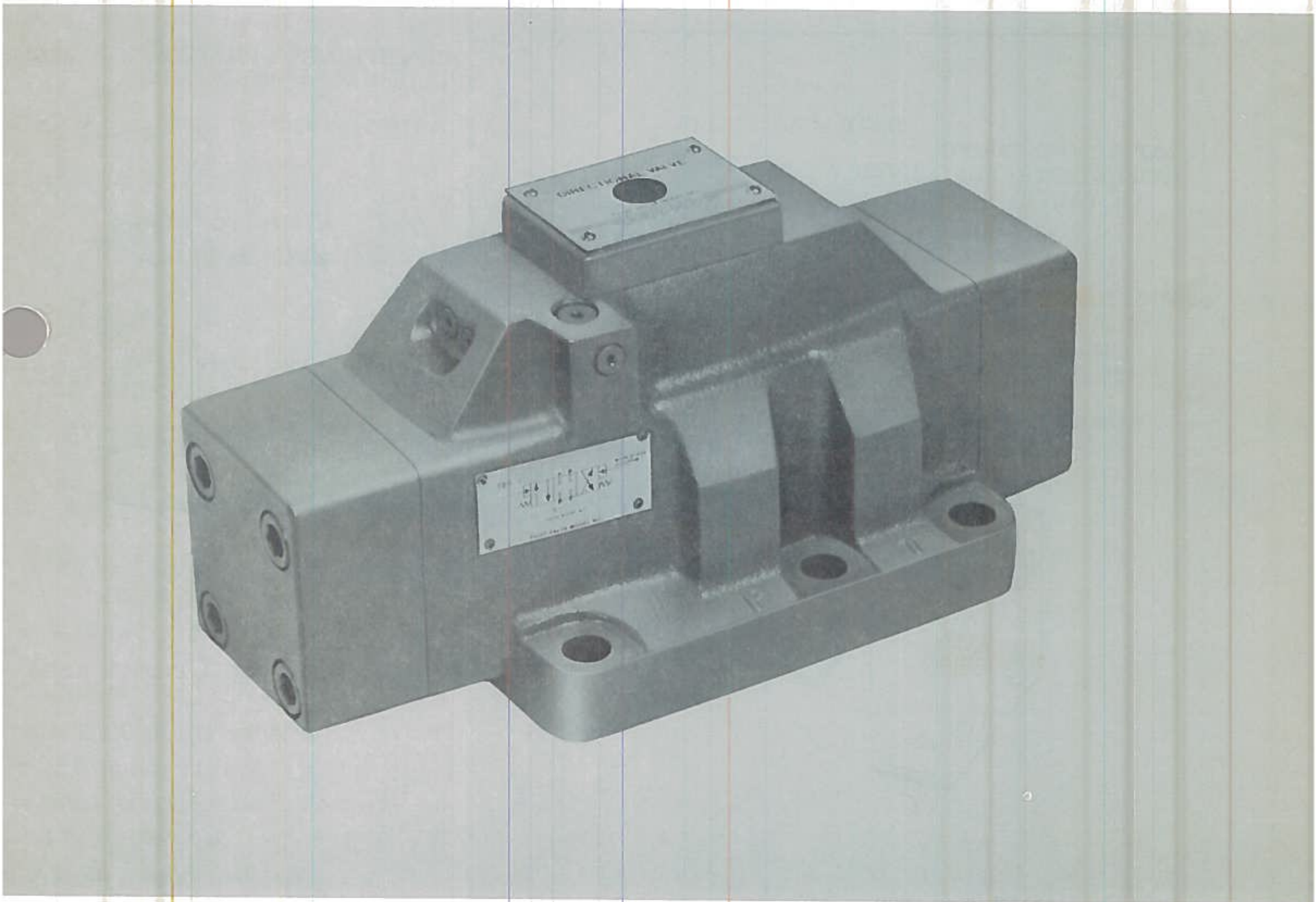
Service Parts Information

Pilot Operated Directional Control Valves

DG3S4-10*C(X)-*-*-53
DG3S4-10*(X)-*-*-53



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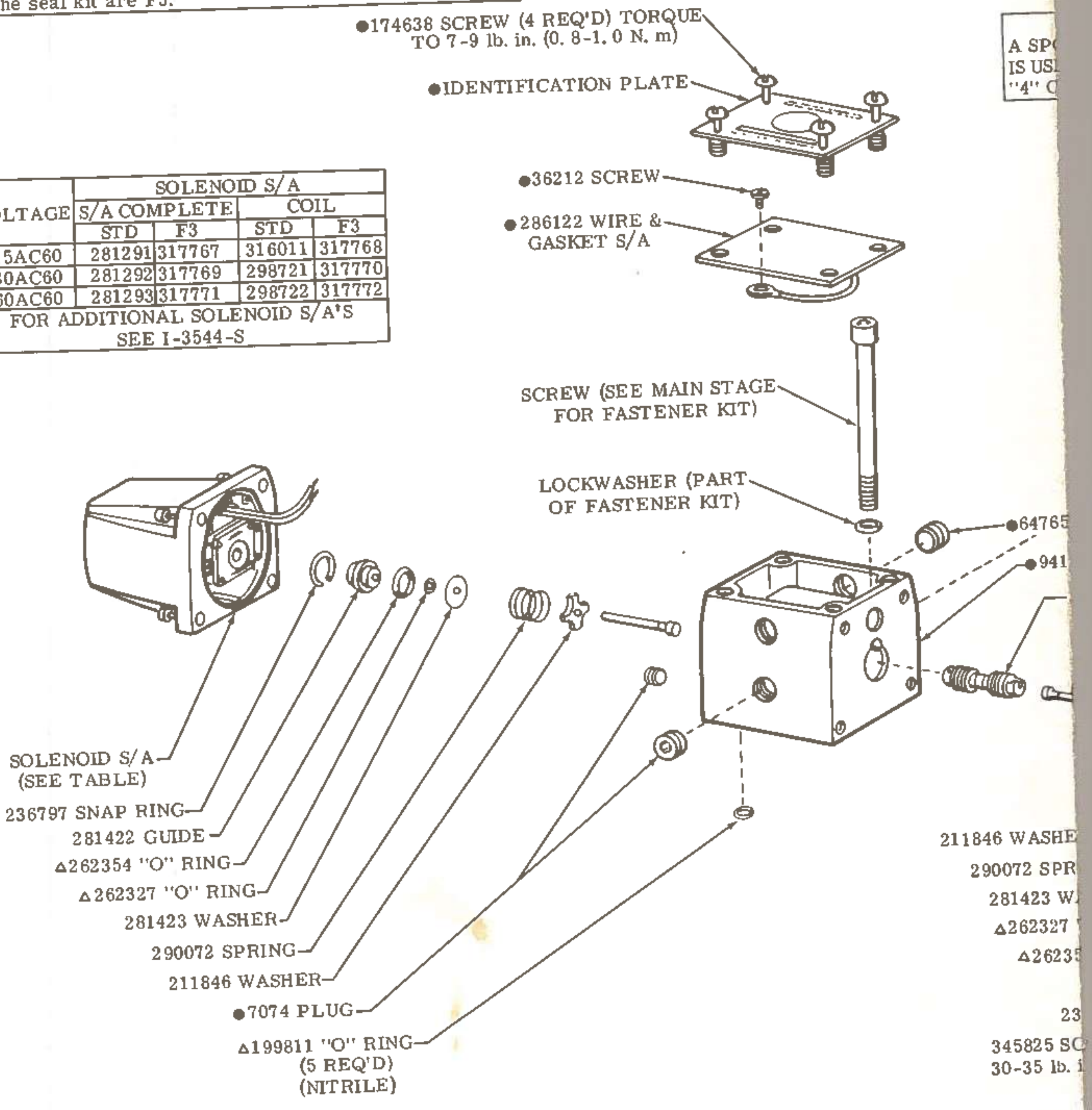
SEAL KIT NOTE

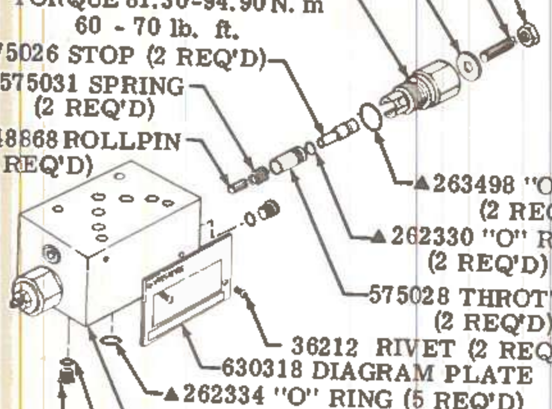
The -53 design valves are manufactured as shown with F3 seals used internally. Interface seals are standard Nitrile material and are converted to F3 in the seal kit. All seals in the seal kit are F3.

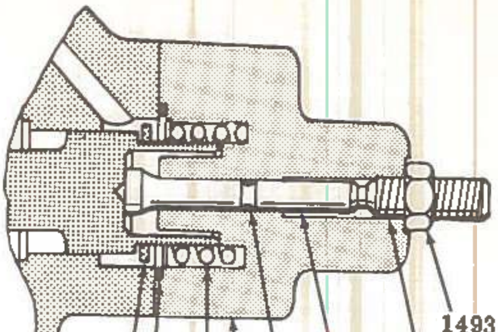
VOLTAGE	SOLENOID S/A			
	S/A COMPLETE		COIL	
	STD	F3	STD	F3
115AC60	281291	317767	316011	317768
230AC60	281292	317769	298721	317770
460AC60	281293	317771	298722	317772
FOR ADDITIONAL SOLENOID S/A'S SEE I-3544-S				



●INCLUDED IN 941853 BODY S/A

△INCLUDED IN F3 PILOT VALVE SEAL KIT 919214.





MODEL CODE BREAKDOWN

(F3)-(P) DG5S4(L)-10*D(*)(X)(**)-(E)-53**

- (F3) – MULTI-FLUID CAPABILITY (VITON SEALS)
- (P**) – ELECTRICAL PLUG FEATURE (SEE NOTE BELOW)
- D – DIRECTIONAL VALVE
- G – SUBPLATE OR MANIFOLD MOUNTED
- 5 – SOLENOID CONTROLLED PILOT OPERATED
- S – SLIDING SPOOL
- 4 – FLOW DIRECTIONS: 4 - 4 WAY
- (L) – L - SOLENOID INDICATOR LIGHTS; OMITTED - NONE
- 10 – 1.25 INCH SERIES 100
- * – TYPE OF MAIN STAGE SPOOL
- D – PRESSURE CENTERED
- (*) – PILOT PRESSURE RANGE
  - A - 300-1000 PSI (20.7 - 70.0 bar)
  - B - 1000-2000 PSI (70.0-138.0 bar)
  - OMITTED - 2000-3000 PSI (138.0-207.0 bar)
- (X) – "X" - FAST RESPONSE MODEL (AVAILABLE ONLY FOR "A" PILOT PRESS RANGE); OMITTED - LOW SHOCK MODEL
- (**) – SPOOL CONTROL MODIFICATION (OMIT WHEN NOT REQUIRED)
  - 2 - PILOT CHOKE ADJUSTMENT
  - 8 - STROKE ADJ. CYLINDER "B" END ONLY
  - 2-8 - IF BOTH ARE REQUIRED
- (E) – E - EXTERNAL PILOT PRESS.; OMITTED - INTERNAL PILOT PRESSURE
- 53 – DESIGN

ELECTRICAL PLUG FEATURE (OMIT IF NOT REQUIRED)

PA - INSTA-PLUG, MALE RECEPTACLE ONLY PB - INSTA-PLUG, MALE & FEMALE RECEPTACLE	PA3 (3 PIN) & PA5 (5 PIN) RECEPTACLES THAT MEET NFPA HYDRAULIC VALVE ELECTRICAL STANDARD T3.5.29M-1980.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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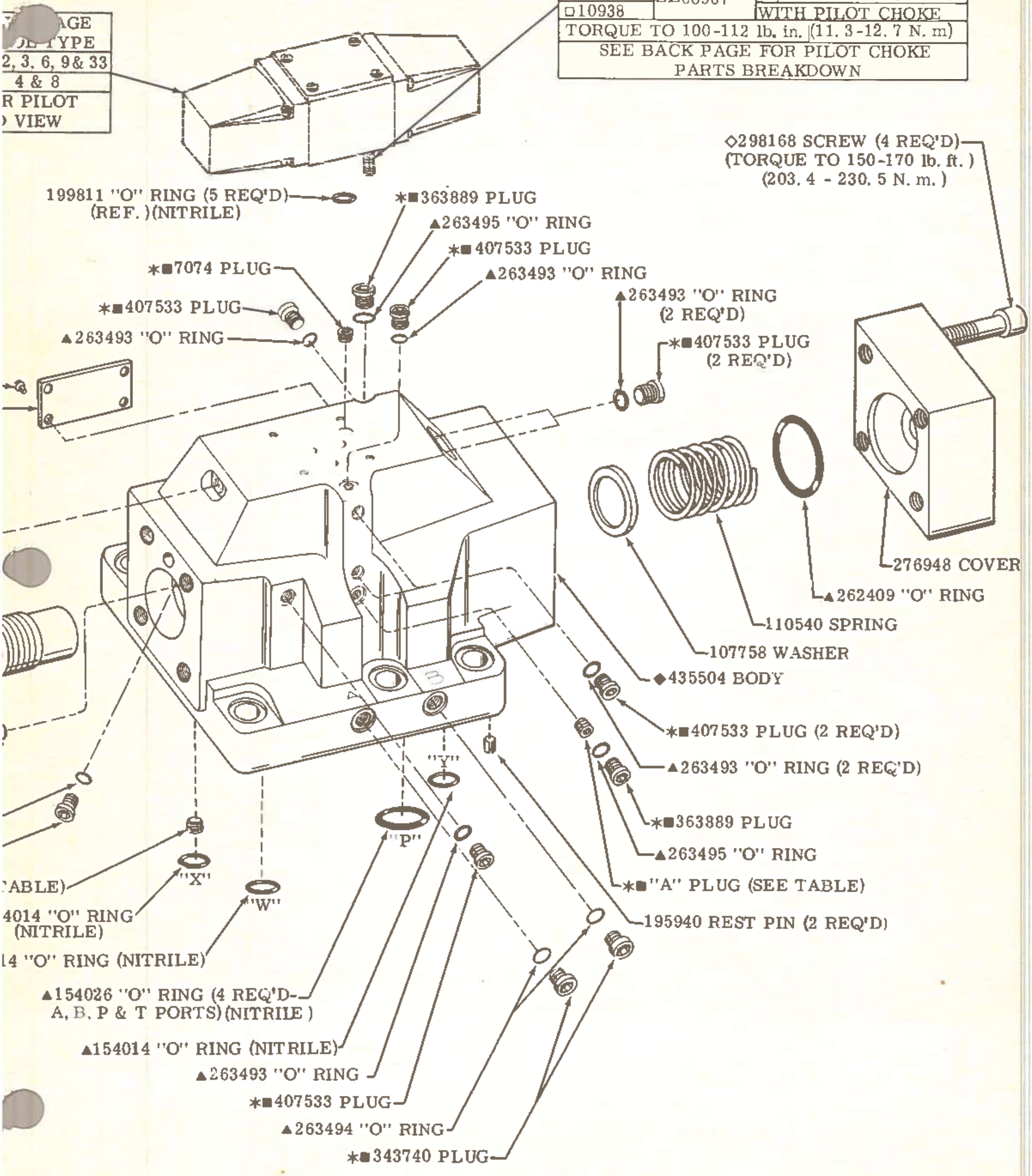
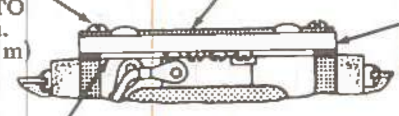
PILOT ATTACHING PARTS		
BOLT (4 REQ'D)	L'WASHER (4 REQ'D)	MODEL
⌀ 1034	□⌀68907	W/OUT PILOT CHOKE
□10938		WITH PILOT CHOKE
TORQUE TO 100-112 lb. in.	(11. 3-12. 7 N. m)	
SEE BACK PAGE FOR PILOT CHOKE PARTS BREAKDOWN		



G4S4-01*C-*-50 PILOT VALVE		
SPOOL		DIAGRAM PLATE
TYPE	PART	
7	236624	290346
78		577482

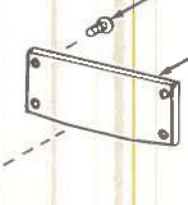
NOTE
DESIGNATION OF (78) INDICATES VALVE
AS A PILOT FOR TWO STAGE VALVES WITH
" TYPE MAIN STAGE SPOOLS.

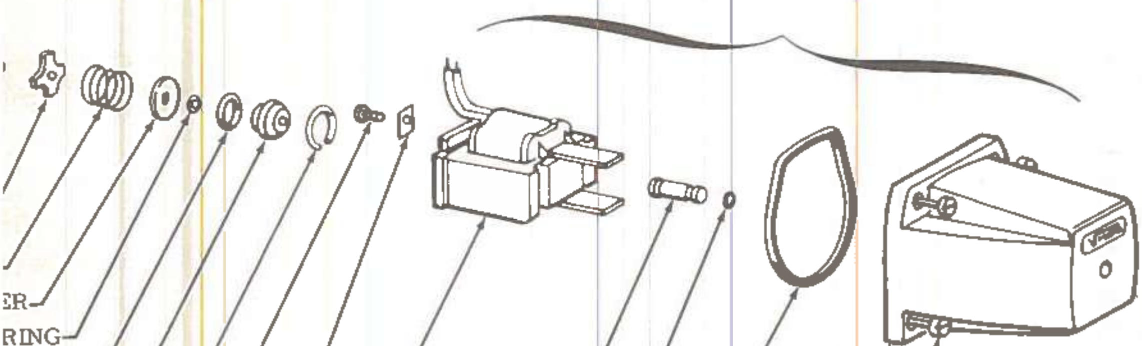
FOR MODELS WITH
SOLENOID INDICATOR LIGHTS



SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617

NOTE
REFER TO PARTS DRAWING
I-3487-S FOR MODELS WITH
PLUG-IN FEATURE.





MODEL	SPOOL	ID PLATE W. CIRCUIT DIAG.
DG5S4-100D-53	364037	400967
DG5S4-101D-53	*331404	400968
DG5S4-102D-53	364038	400969
DG5S4-103D-53	*277479	400970
DG5S4-104D-53	281193	400971
DG5S4-106D-53	364039	400972
DG5S4-108D-53	364041	400971
DG5S4-109D-53	277563	400967
DG5S4-1033D-53	364042	400972

*NOTE
ASSEMBLE TYPE 1 AND 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END OF VALVE IS DEFINED AS BEING CLOSEST TO CYLINDER PORT "A".

∗PLUG INSTALLATION TABLE

MODEL	"A" PLUG	"B" PLUG
-10*D-53	226987	OUT
-10*D-E-53	7074	226987
-10*DA-53	30560	OUT
-10*DA-E-53	7074	30560
-10*DAX-53	OUT	OUT
-10*DAX-E-53	7074	OUT
-10*DB-53	224026	OUT
-10*DB-E-53	7074	224026

7074 IS AN NPTF PIPE PLUG. OTHERS ARE NPTF ORIFICE PLUGS.

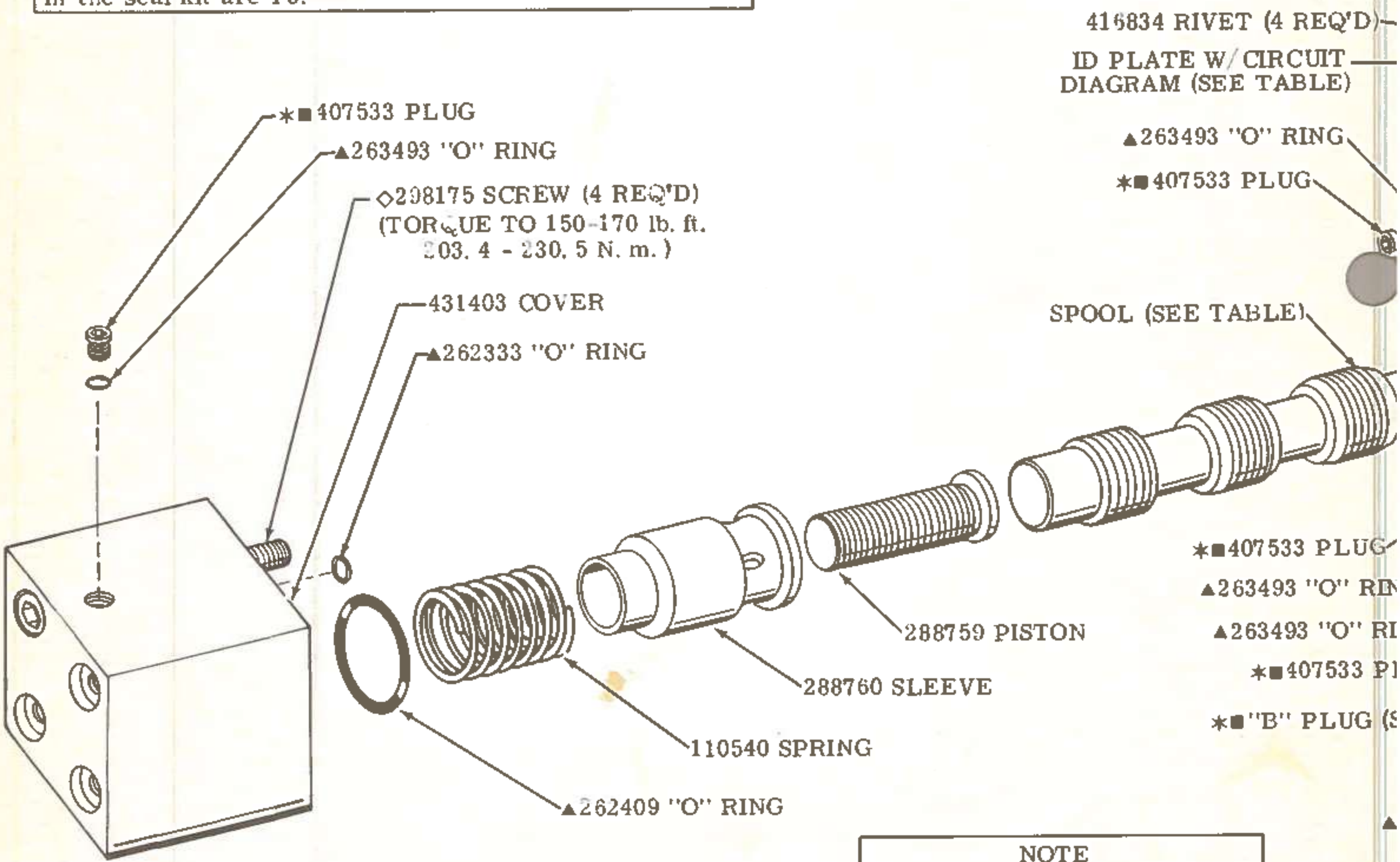
PILOT MODEL	
DG4S4-017C-*-50	
DG4S4-0178C-*-50	

SEE BACK PAGE ... VALVE EXPLO...

■PLUG TORQUES (OILED)

PLUG	N. m.	lb. in.
7074	8.5 - 9.6	75-85
7075	20.0 - 23.0	180-205
30560	8.5 - 9.6	75-85
224026	8.5 - 9.6	75-85
226987	8.5 - 9.6	75-85
343740	10.0 -11.8	90-105
363889	16.9 -18.0	150-160
407533	3.4 - 4.0	30-35

SEAL KIT NOTE
The -53 design valves are manufactured as shown with F3 seals used internally. Interface seals are standard Nitrile material and are converted to F3 in the seal kit. All seals in the seal kit are F3.



NOTE
SAE STRAIGHT THREAD PLUGS USED ON EXTERIOR OF VALVE

△▲INCLUDED IN F3 SEAL KIT 920213
∗INCLUDED IN PLUG KIT 941263
◇INCLUDED IN FASTENER KIT 941273
⌀INCLUDED IN BOLT KIT 255633
□INCLUDED IN BOLT KIT 255654
■ PLUG TORQUES SEE TABLE
◆NOT AVAILABLE FOR SALE

NOTE
PARTS INCLUDED IN SERVICE KITS NOT SOLD SEPARATELY

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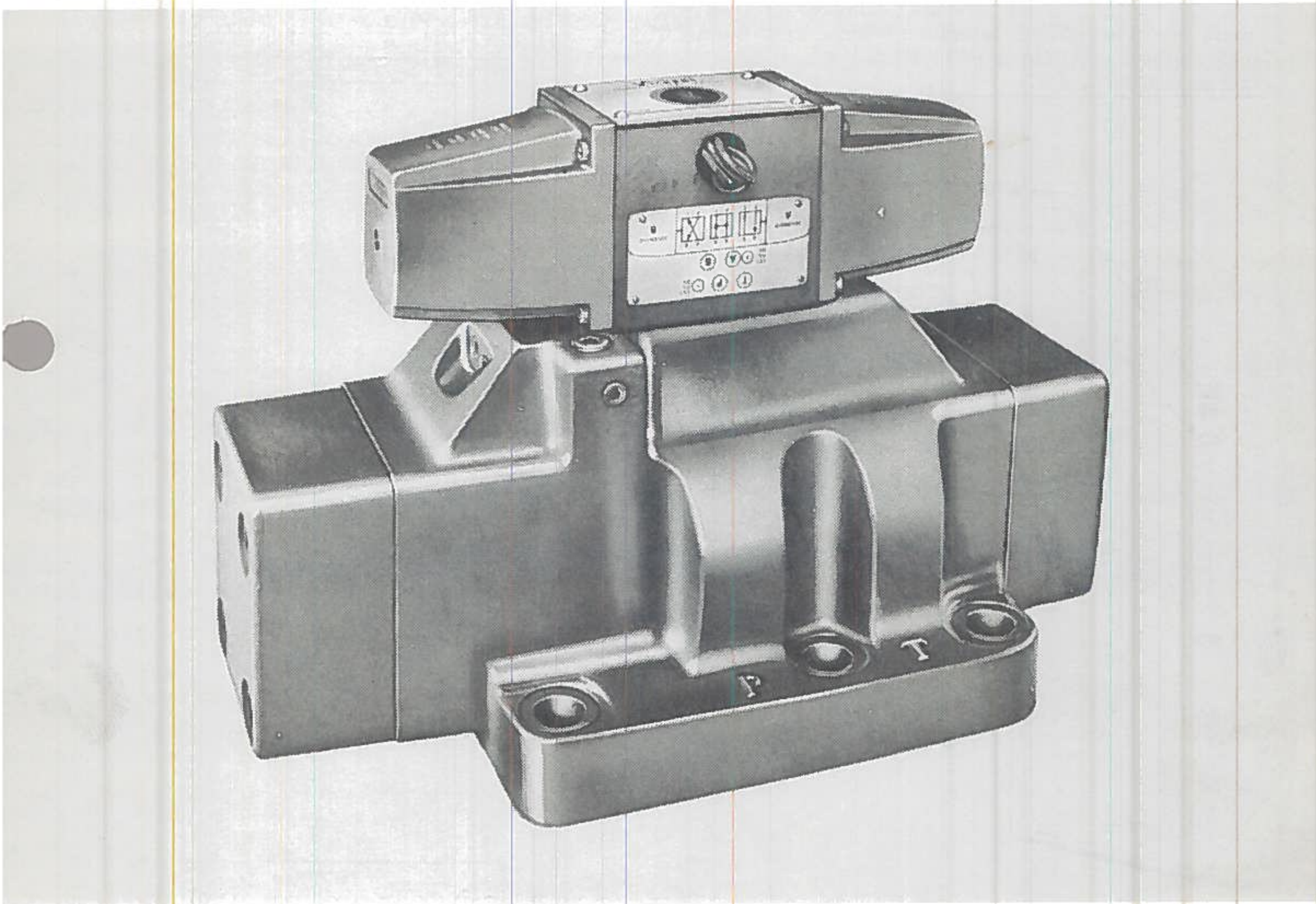
Service Parts Information

Air Gap
Solenoid Controlled
Pilot Operated
Directional
Control Valves

DG5S4(L)-10*D(X)-*-*-53



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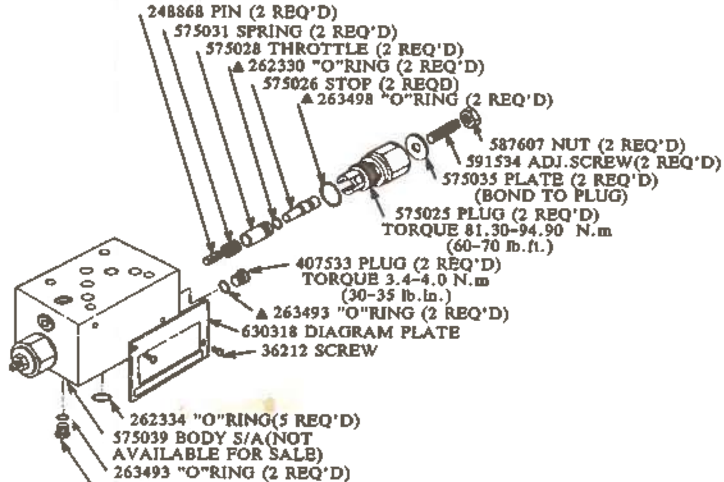
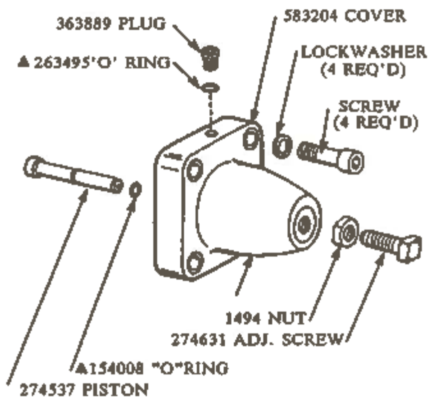


DGMFN-5-Y-AW-BW-20

▲ INCLUDED IN F3 SEAL KIT 920246



STROKE ADJUSTMENT OPTION

MODEL CODE BREAKDOWN

(F3)(P) D F 5 S 4 (L) - 16 ** - * - (E) - W(3) - * - 53**

- (F3) — MULTI-FLUID CAPABILITY (VITON SEALS)
- (P**) — ELECTRICAL PLUG FEATURE (SEE NOTE BELOW)
- D — DIRECTIONAL VALVE
- F — FLANGE CONNECTION
- 5 — SOLENOID CONTROLLED PILOT OPERATED
- S — SLIDING SPOOL
- 4 — FLOW DIRECTIONS
  4 - 4 WAY
- (L) — L - SOLENOID INDICATOR LIGHTS
  OMITTED - NONE
- 16 — VALVE SIZE 160 SERIES (2 INCH)
- ** — TYPE OF MAIN STAGE SPOOL
- VALVE TYPE
  A - SPRING OFFSET
  B - SPRING CENTERED (ONE SOLENOID)
  C - SPRING CENTERED
  N - DETENTED
- * — SPOOL CONTROL MODIFICATIONS (OMIT IF NOT REQ'D)
  1 - STROKE ADJUSTMENTS
  2 - PILOT CHOKE
  3 - PILOT CHOKE & STROKE ADJ
  7 - STROKE ADJ. "A" END ONLY
  8 - STROKE ADJ. "B" END ONLY
- (E) — E - EXTERNAL PILOT PRESSURE
  OMITTED - INTERNAL PILOT PRESS
- W(3) — W - NON-SERVICEABLE CORE TUBE IN PILOT
  W3 - SERVICEABLE CORE TUBE IN PILOT
- * — COIL IDENTIFICATION LETTER
- 53 — DESIGN

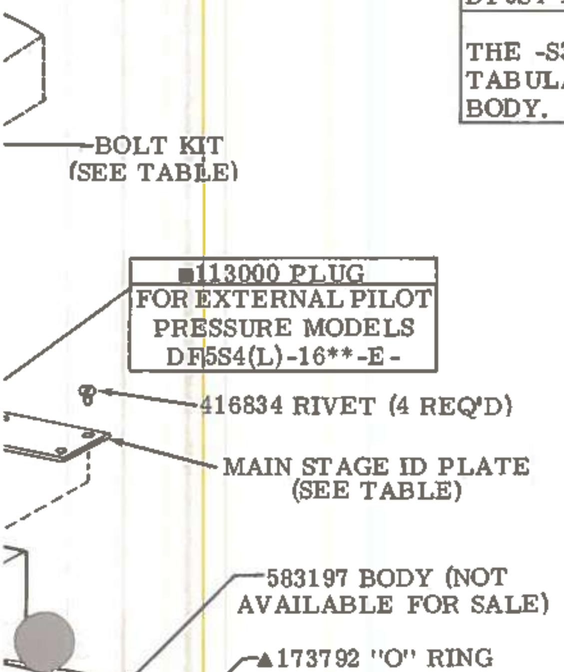
ELECTRICAL PLUG FEATURE (OMIT IF NOT REQUIRED)	
PA - INSTA-PLUG, MALE RECEPTACLE ONLY PB - INSTA-PLUG, MALE & FEMALE RECEPTACLE	PA3 (3 PIN) & PA5 (5 PIN) RECEPTACLES THAT MEET NFPA HYDRAULIC VALVE ELECTRICAL STANDARD T3. 5. 29M-1980.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

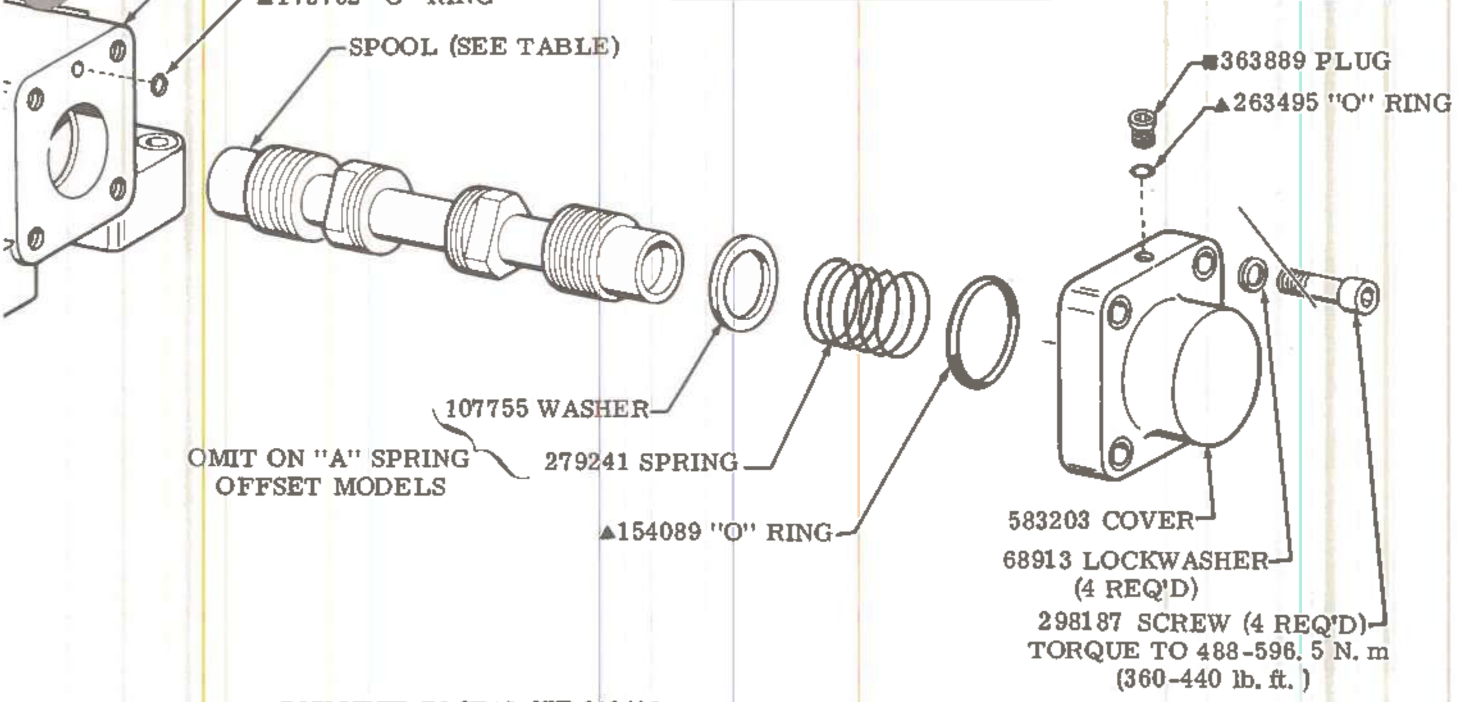
VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE	PARTS DWG. SEE NOTE
DF5S4-16*A-*-53	0, 2, 6, 9, 33	DG4S4-012A-W-*-50-S344	I-3557-S
DF5S4-16*B-*-53	0, 1, 2, 3, 6, 9, 31, 33	DG4S4-016B-W-*-50-S344	I-3558-S
	4 & 8	DG4S4-0168B-W-*-50-S344	
DF5S4-16*C-*-53	0, 1, 2, 3, 6, 9, 31, 33	DG4S4-016C-W-*-50-S344	
	4 & 8	DG4S4-0168C-W-*-50-S344	
DF5S4-16*N-*-53	0, 2, 6, 9, 33	DG4S4-012N-W-*-51-S344	I-3559-S

NOTE
THE -S344 PILOT VALVE IS THE SAME AS THE VALVE SHOWN ON THE TABULATED PARTS DRAWING EXCEPT: 434286 BODY REPLACES 400817 BODY. 407533 PLUG & 263493 "O" RING ARE OMITTED.



VALVE MODEL CODE		SPOOL	MAIN STAGE ID PLATE W/CIRCUIT DIAGRAM	
MAIN STAGE	VALVE TYPE		"A" ONLY	B/C/N
DF5S4-160-	A/B/C/N	273677	400975	400976
DF5S4-161-	B/C	*386581		400977
DF5S4-162-	A/B/C/N	273676		400978
DF5S4-163-	B/C	*275803		400979
DF5S4-164-	B/C	*273720		400980
DF5S4-166-	A/B/C/N	275804		400981
DF5S4-168-	B/C	*275805		400980
DF5S4-169-	A/B/C/N	275806		400976
DF5S4-1631-	B/C	*275803		580475
DF5S4-1633-	A/B/C/N	317777		400981

*SEE SPOOL ASSEMBLY VIEW

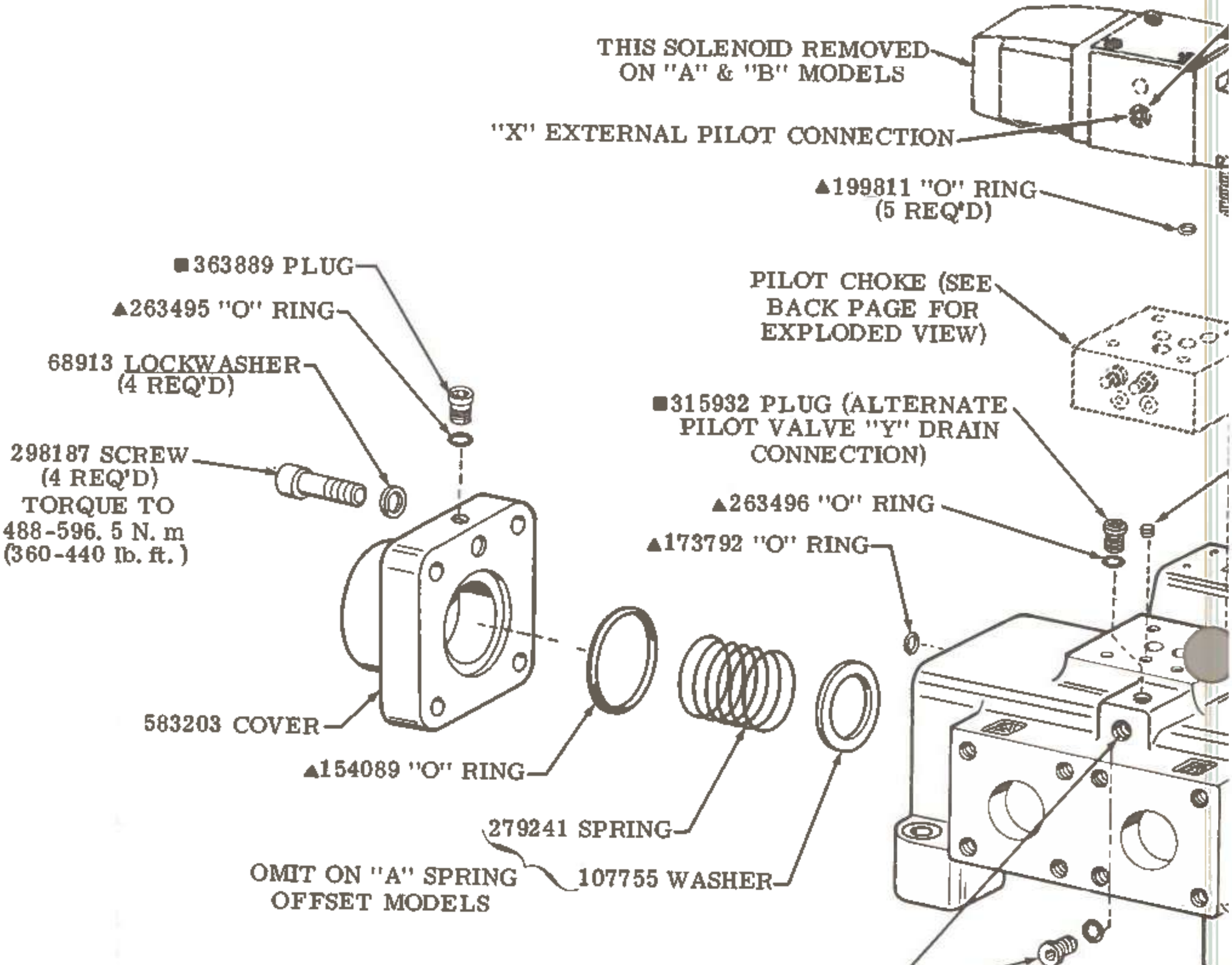


▲INCLUDED IN SEAL KIT 919405
F3 EQUIVALENT SEAL KIT 919434
■PLUG TORQUES (SEE TABLE)

NOTE
SEE MODEL CODE PAGE FOR SOLENOID INDICATOR LIGHT PARTS

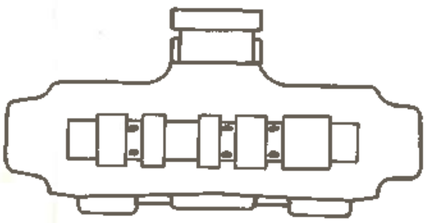
NOTE
PARTS INCLUDED IN SERVICE KITS NOT SOLD SEPARATELY

PILOT ATTACHING PARTS	
MODEL	BOLT KIT
W/OUT PILOT CHOKE	255633
WITH PILOT CHOKE	255654
TORQUE TO 11.3 – 12.65 N.m (100 – 112 lb.in.)	

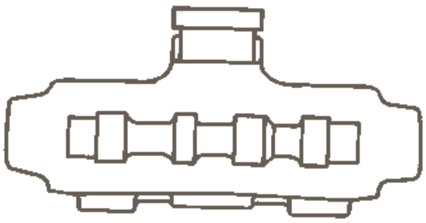


■PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
113000	5. 08 - 5. 88	45 - 52
315932	22. 5 -27. 0	200 - 240
363889	16. 95 - 17. 08	150 - 160

ASSEMBLE TYPE 4 & 8 SPOOLS WITH WIDE UNDERCUT TOWARD "A" END



ASSEMBLE TYPE 1 & 3 SPOOLS WITH TAPER TOWARD "B" END. TYPE 31 SPOOL IS ASSEMBLED WITH TAPER TOWARD "A" END.



SPOOL ASSEMBLY

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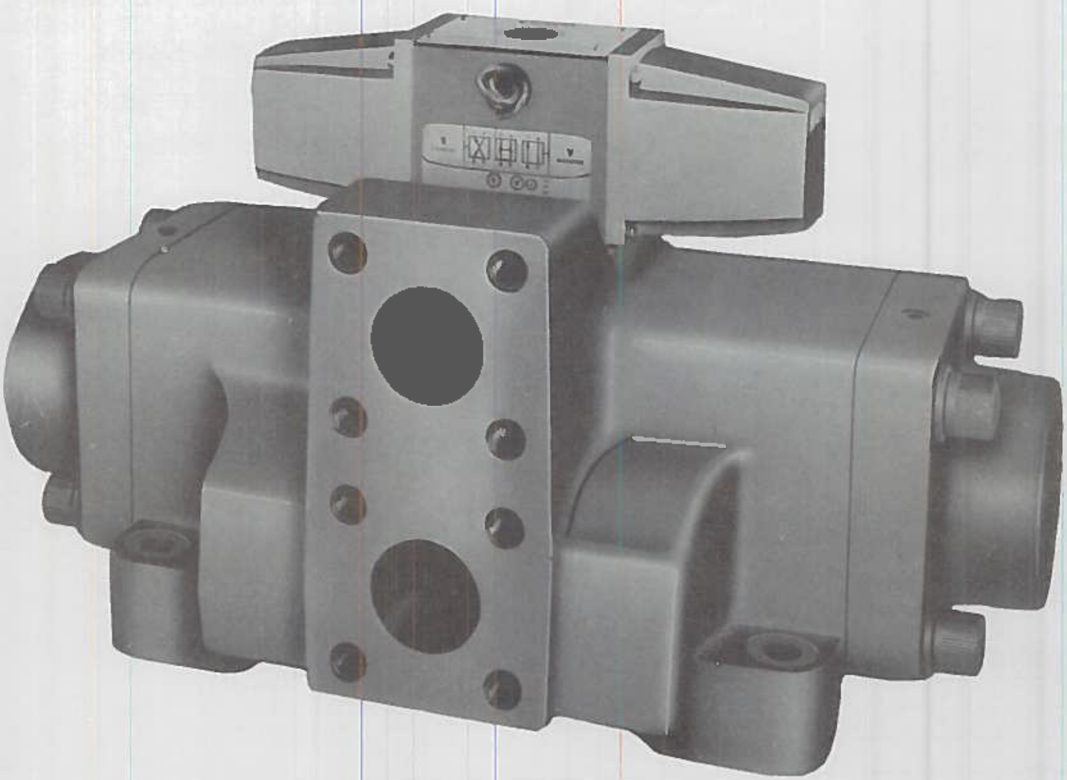
Service Parts Information

Wet Armature Solenoid Controlled Pilot Operated Directional Valves

DF5S4-16*A-*-(E)-W(3)-*-53
DF5S4-16*B-*-(E)-W(3)-*-53
DF5S4-16*C-*-(E)-W(3)-*-53
DF5S4-16*N-*-(E)-W(3)-*-53



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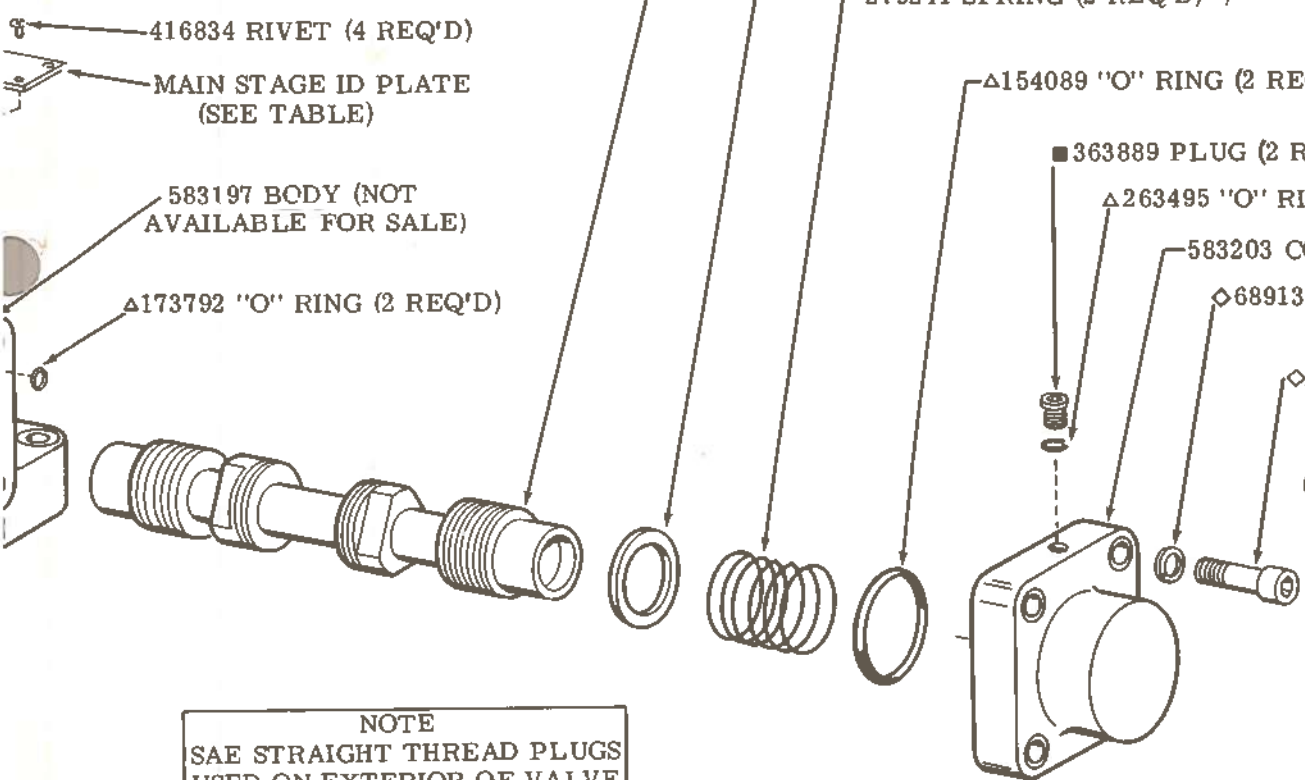
VALVE MODEL CODE		SPOOL	MAIN STAGE ID PLATE W/CIRCUIT DIAGRAM	
MODEL	VALVE TYPE		"A" ONLY	B/C/N
DF5S4-160-	A/B/C/N	273677	400975	400976
DF5S4-161-	B/C	*386581		400977
DF5S4-162-	A/B/C/N	273676		400978
DF5S4-163-	B/C	*275803		400979
DF5S4-164-		*273720		400980
DF5S4-166-	A/B/C/N	275804		400981
DF5S4-168-	B/C	*275805		400980
DF5S4-169-	A/B/C/N	275806		400976
DF5S4-1631-	B/C	*275803		580475
DF5S4-1633-	A/B/C/N	317777		400981
* SEE SPOOL ASSEMBLY NOTE				

PILOT ATTACHING PARTS		
MODEL	SCREW (4 REQ'D)	WASHER (4 REQ'D)
W/OUT PILOT CHOKE	□ 1034	⌀□68907
WITH PILOT CHOKE	⌀ 10938	
TORQUE TO 100-112 lb. in. (11.3-12.7 N. m)		
SEE OTHER PAGE FOR PILOT CHOKE PARTS		

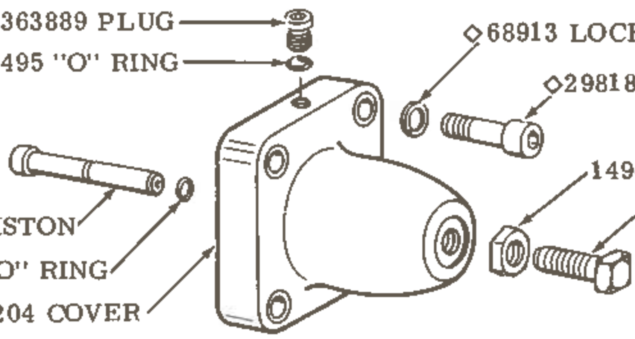


NOTE
SAE STRAIGHT THREAD PLUGS USED ON EXTERIOR OF VALVE

34

11292

STROKE ADJ. PARTS

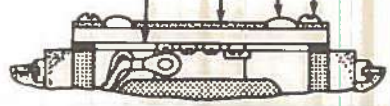


NOTE
FOR SINGLE SOLENOID MODELS RIGHT HAND ASSEMBLY SHOWN. FOR LEFT HAND ASSEMBLY ALL PARTS ARE REVERSED, EXCEPT BODY & SPOOL.
Ex. LH MODEL: DG4S4-01**-*-5*-S344-LH

NOTE
A SPOOL DESIGNATION OF (68B) INDICATES VALVE IS ASSEMBLED "LH" & IS USED AS A PILOT FOR TWO STAGE VALVES WITH "4" OR "8" TYPE MAIN STAGE SPOOLS.

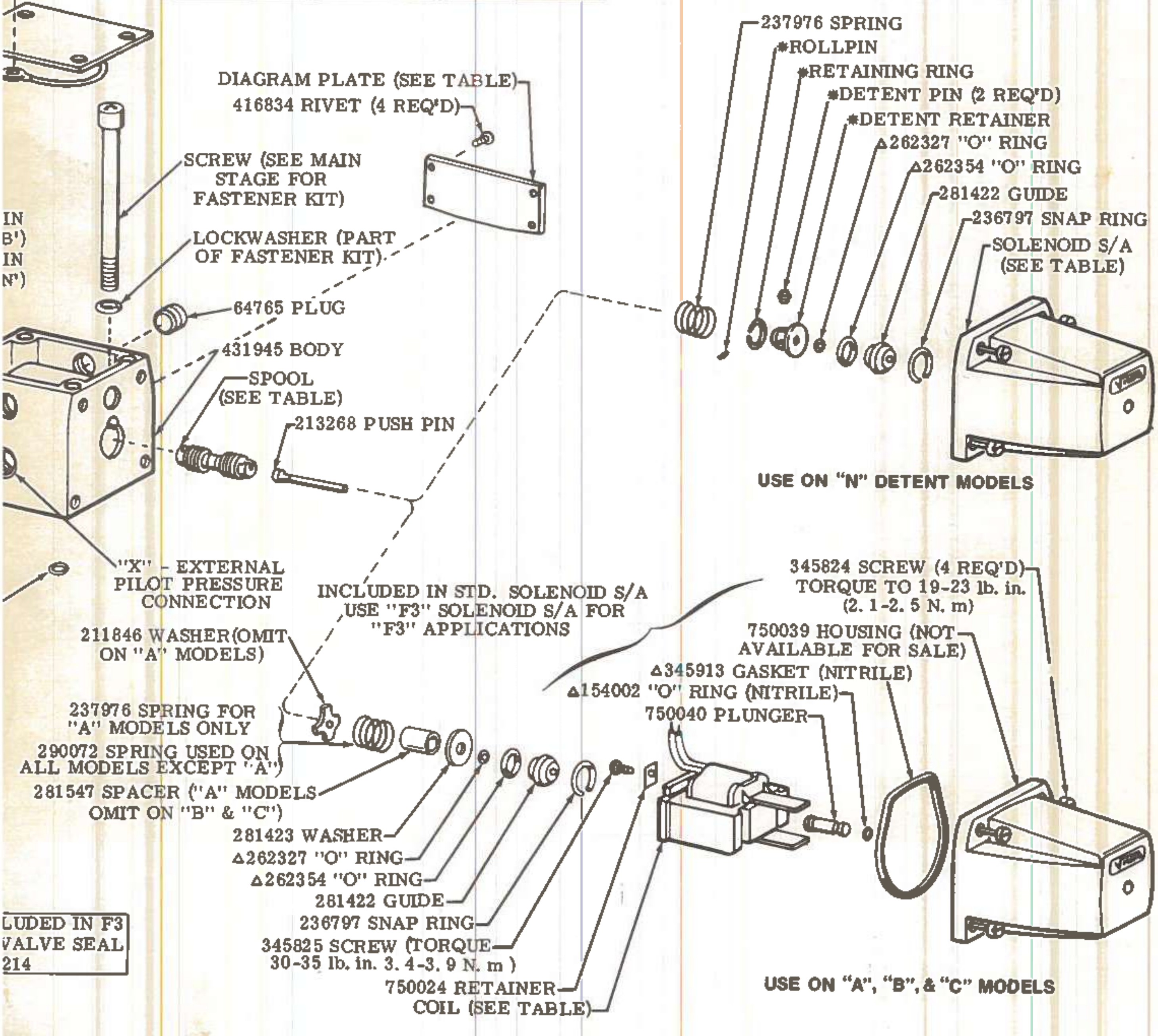
SPOOL		DIAGRAM PLATE			
		"A"		"B" & "C"	"N"
TYPE	PART	LH	RH		
2	213131	577490	290348	———	577486
6	213232	———	———	290345	———
68				577480	

298785 SCREW (TORQUE TO 7-9 lb. in, 0.8-1.0 N. m)
SOLENOID INDICATOR LIGHT
IDENTIFICATION PLATE
298782 GASKET



SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617

FOR MODELS WITH SOLENOID INDICATOR LIGHTS

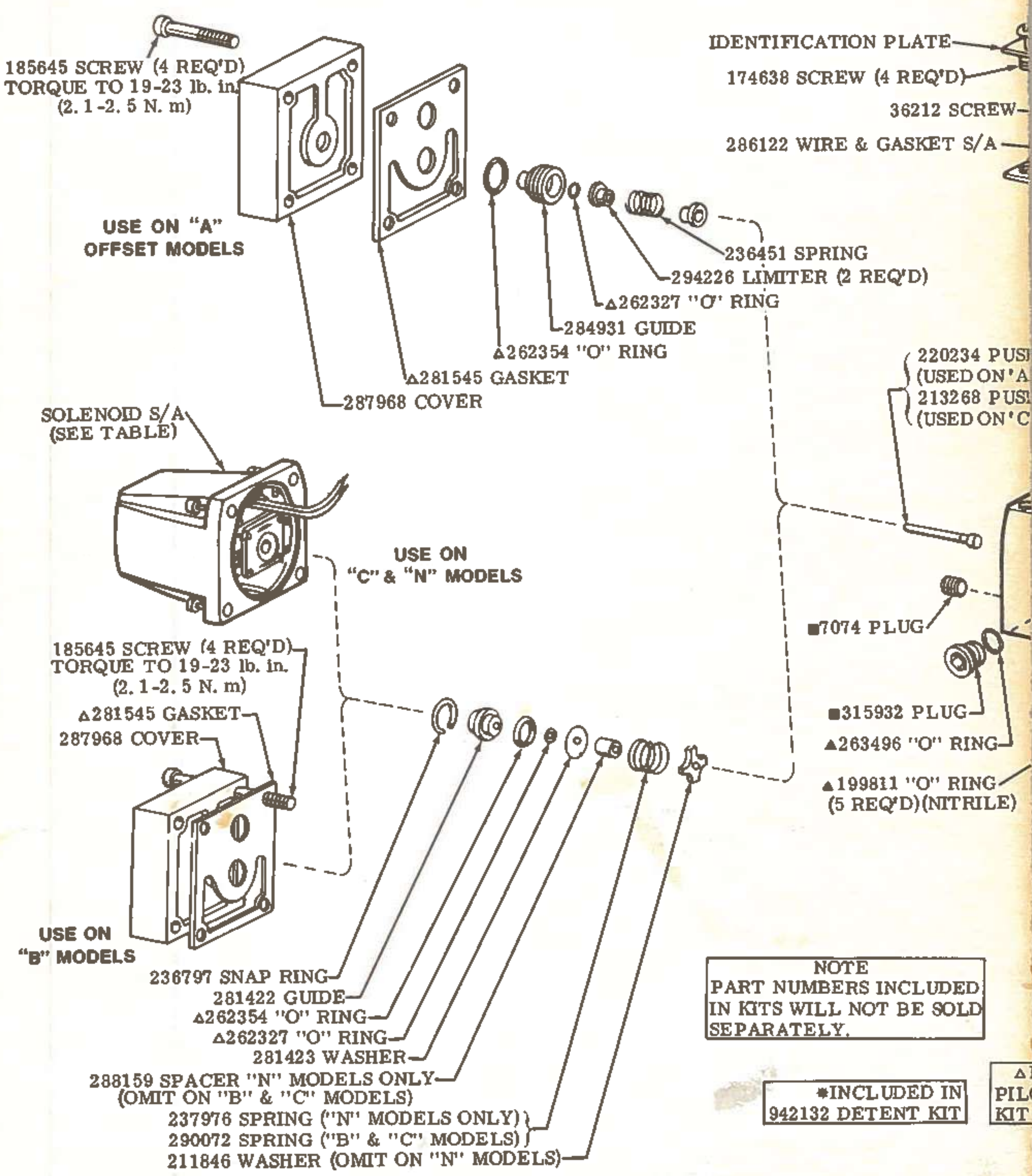


LUDED IN F3
VALVE SEAL
214

VOLTAGE	SOLENOID S/A			
	S/A COMPLETE		COIL	
	STD	F3	STD	F3
115AC60	281291	317767	316011	317768
230AC60	281292	317769	298721	317770
460AC60	281293	317771	298722	317772
FOR ADDITIONAL SOLENOID S/A'S SEE I-3544-S				

SEAL KIT NOTE
The -53 design pilot valves are manufactured as show with F3 seals used internally. Interface seals are stan dard Nitrile material and are converted to F3 in the sea kit. All seals in the pilot valve seal kit are F3.

NOTE
REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURE.

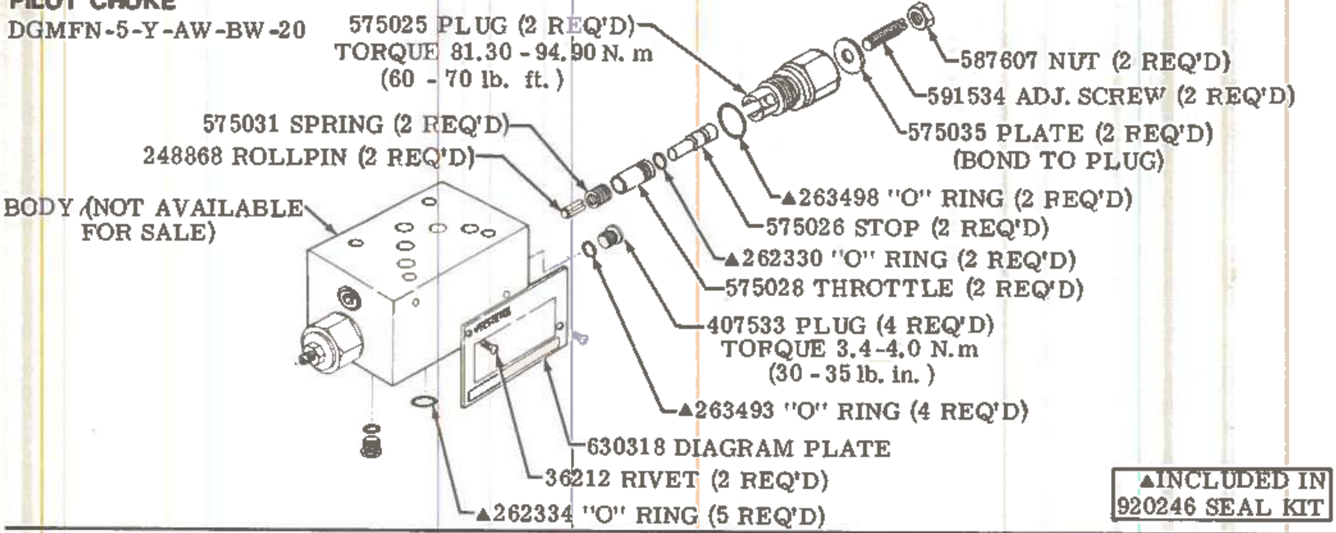


NOTE
PART NUMBERS INCLUDED IN KITS WILL NOT BE SOLD SEPARATELY.

*INCLUDED IN 942132 DETENT KIT

Δ
PIL
KIT

PILOT CHOKE
DGMFN-5-Y-AW-BW-20



MODEL CODE BREAKDOWN

(F3)-DF5S4(L)-16 **-(*)-(E)-(*AC***)-53**

- (F3) — MULTI-FLUID CAPABILITY (VITON SEALS)
- D — DIRECTIONAL VALVE
- F — FLANGE CONNECTION
- 5 — SOLENOID CONTROLLED PILOT OPERATED
- S — SLIDING SPOOL
- 4 — FLOW DIRECTIONS 4 - 4 WAY
- (L) — L - SOLENOID INDICATOR LIGHT; OMITTED - NONE
- 16 — SERIES 160
- * — TYPE OF MAIN STAGE SPOOL
- * — A - SPRING OFFSET; B - SPRING CENTERED SINGLE SOLENOID; C - SPRING CENTERED; N - DETENT
- (*) — SPOOL CONTROL MODIFICATIONS (OMIT IF NOT REQUIRED)
  - 1 - STROKE ADJUSTMENTS
  - 2 - PILOT CHOKE
  - 3 - PILOT CHOKE & STROKE ADJ.
  - 7 - STROKE ADJ. "A" END ONLY
  - 8 - STROKE ADJ. "B" END ONLY
- (E) — OMITTED - INTERNAL PILOT PRESSURE; E - EXTERNAL PILOT PRESSURE
- (***AC***) — VOLTAGE AND FREQUENCY; OMITTED - 115AC60 STD.
- 53 — DESIGN

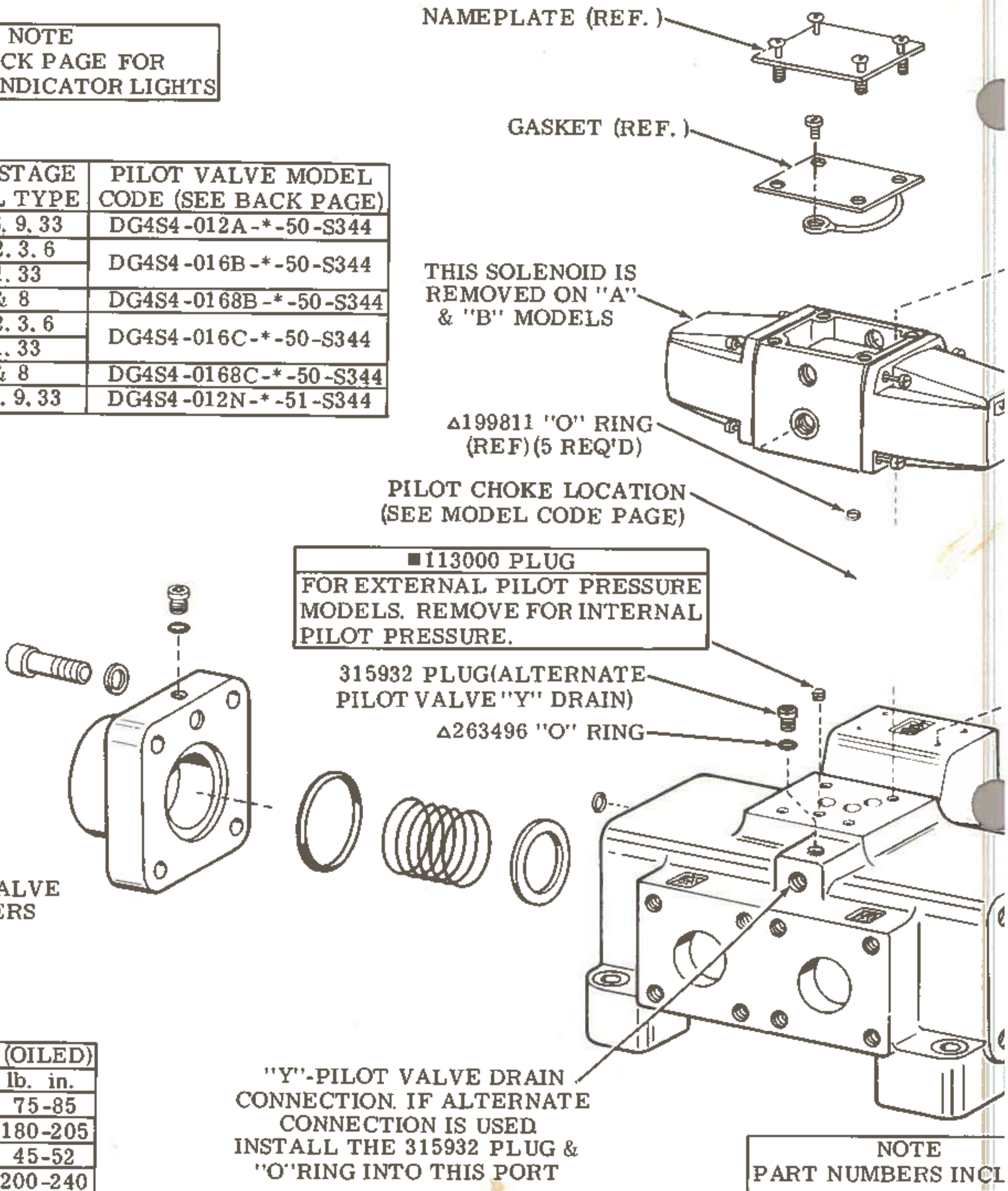
ELECTRICAL PLUG FEATURE (OMIT IF NOT REQUIRED)	
PA - INSTA-PLUG, MALE RECEPTACLE ONLY PB - INSTA-PLUG, MALE & FEMALE RECEPTORS	PA3 (3 PIN) & PA5 (5 PIN) RECEPTACLES THAT MEET NFPA HYDRAULIC VALVE ELECTRICAL STANDARD T3. 5. 29M-1980.

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

NOTE
SEE BACK PAGE FOR
SOLENOID INDICATOR LIGHTS

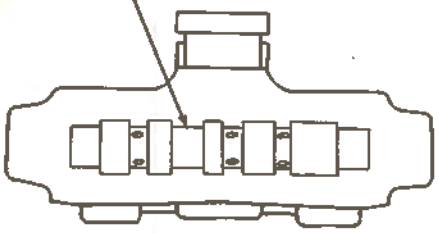
VALVE MODEL	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE (SEE BACK PAGE)
DF5S4-16*A-*-53	0, 2, 6, 9, 33	DG4S4-012A-*-50-S344
DF5S4-16*B-*-53	0, 1, 2, 3, 6	DG4S4-016B-*-50-S344
	9, 31, 33	
	4 & 8	DG4S4-0168B-*-50-S344
DF5S4-16*C-*-53	0, 1, 2, 3, 6	DG4S4-016C-*-50-S344
	9, 31, 33	
	4 & 8	DG4S4-0168C-*-50-S344
DF5S4-16*N-*-53	0, 2, 6, 9, 33	DG4S4-012N-*-51-S344



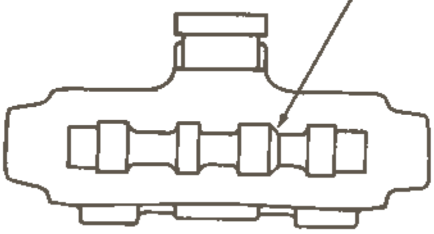
■PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
7074	8.5- 9.6	75-85
7075	20.0-23.0	180-205
113000	5.0- 5.9	45-52
315932	22.5-27.0	200-240
363889	16.9-18.0	150-160

NOTE
PART NUMBERS INCL[...]
IN KITS WILL NOT BE[...]
SEPARATELY.

ASSEMBLE TYPE 4 & 8 SPOOLS WITH WIDE UNDERCUT TOWARD "A" END
"A" END OF VALVE IS DEFINED AS BEING CLOSEST TO CYLINDER PORT "A"



ASSEMBLE TYPE 1 & 3 SPOOLS WITH TAPER TOWARD "B" END. TYPE 31 SPOOL IS ASSEMBLED WITH TAPER TOWARD "A" END.



*SPOOL ASSEMBLY

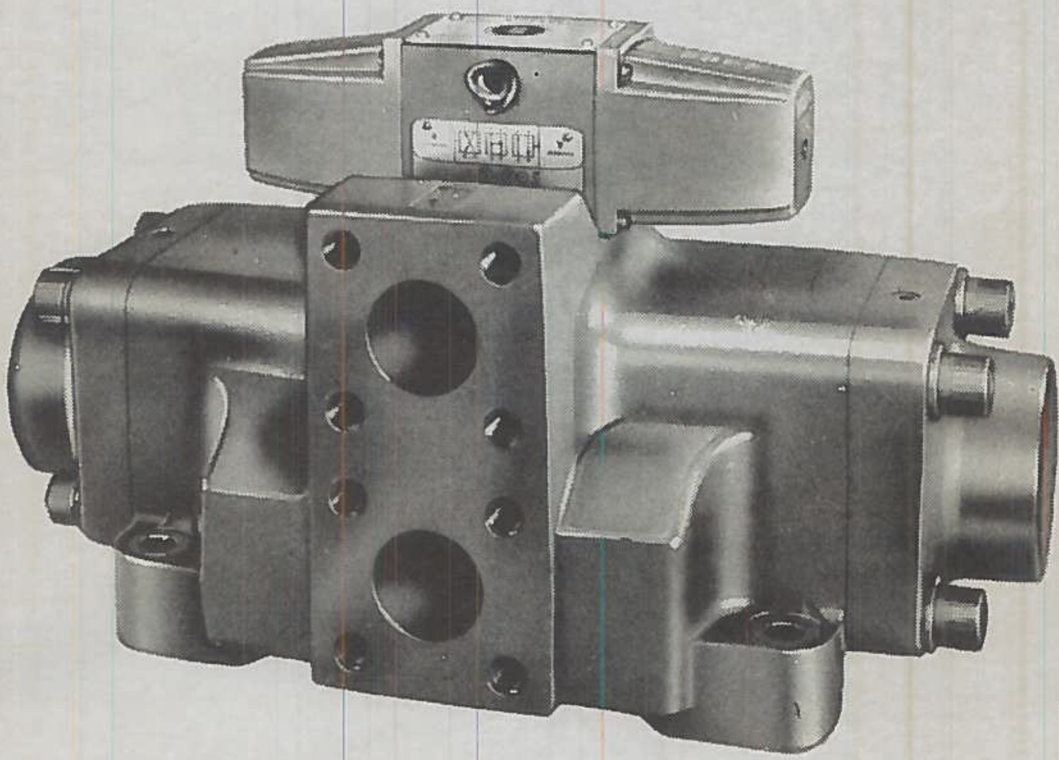
▲△INCLUDED IN SEAL KIT 9[...]
F3 EQUIVALENT SEAL KI[...]
□INCLUDED IN BOLT KIT [...]
⊠INCLUDED IN BOLT KIT [...]
◇INCLUDED IN FASTENER[...]
■PLUG TORQUES (SEE TA[...]

VICKERS
A TRINOVA COMPANY

Service Parts Information

Air Gap Solenoid Controlled Pilot Operated Directional Control Valves

DF5S4(L)-16*A-(*)-(E)-53
DF5S4(L)-16*B-(*)-(E)-53
DF5S4(L)-16*C-(*)-(E)-53
DF5S4(L)-16*N-(*)-(E)-53



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 9-1-86

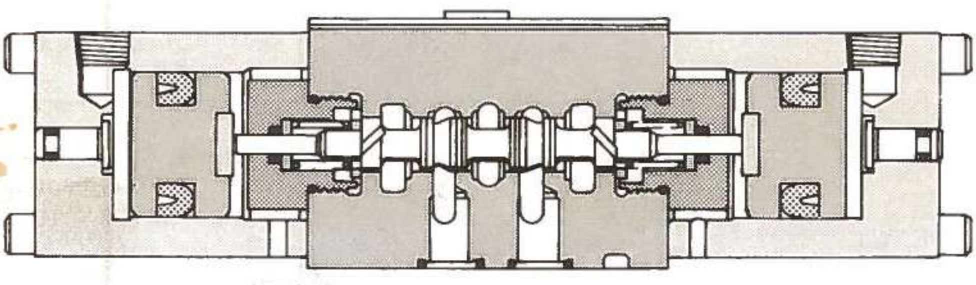
I-3622-S

114

MODEL CODE BREAKDOWN

DG18V-3-(P)(L)-40**

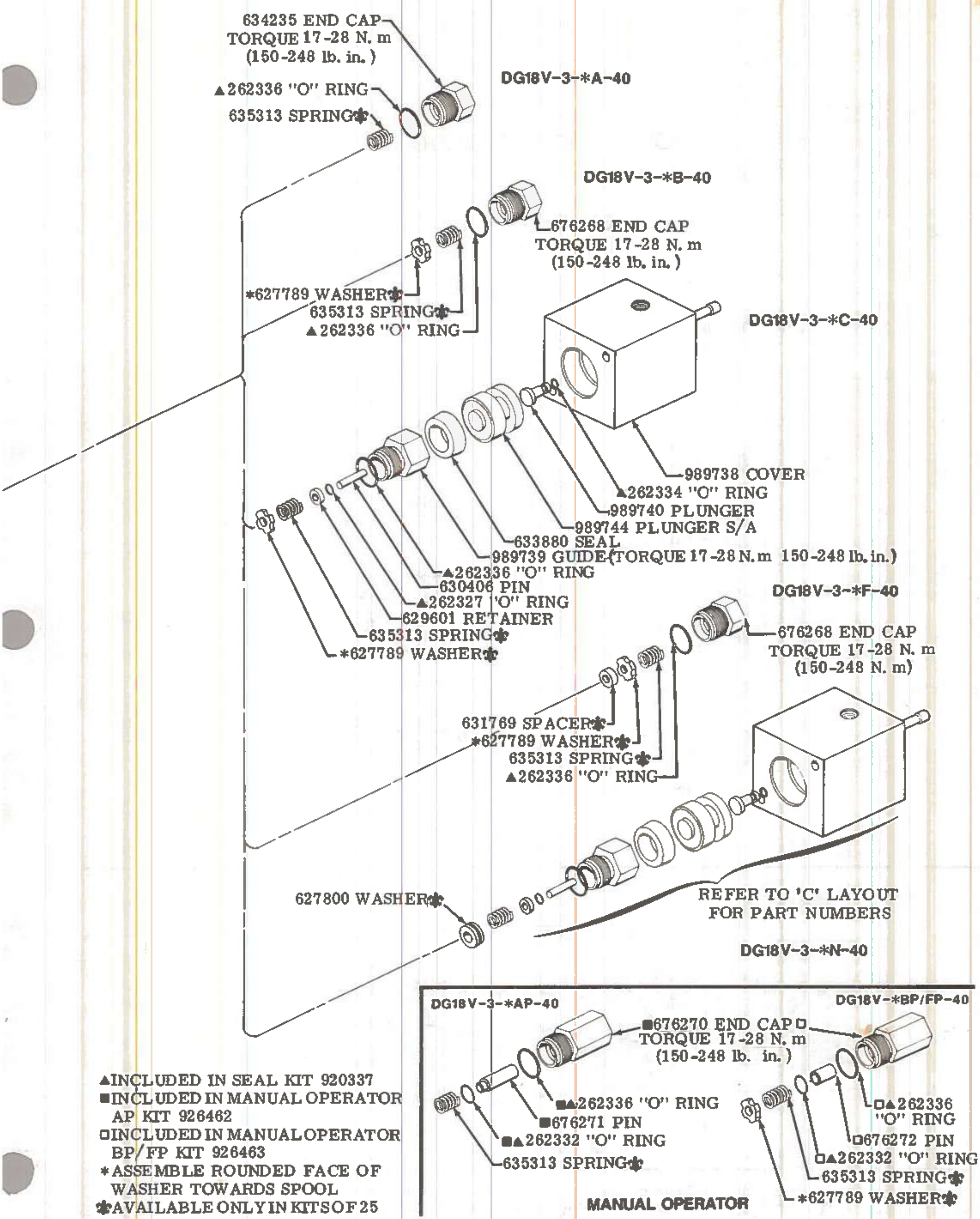
- DG — DIRECTIONAL CONTROL VALVE
- 1 — SUBPLATE MOUNTED
- 8 — AIR PILOT OPERATED
- V — RATED PRESSURE 350 bar (5000 PSI)
- 3 — INTERFACE NFPA D01 ISO4401-03
- * — SPOOL TYPE
- * — SPRING/SPOOL ARRANGEMENT
  - A - SPRING OFFSET TO CYL. A
  - B - SPRING CENTERED-SINGLE OPERATOR
  - C - SPRING CENTERED
  - F - SPRING OFFSET TO CYL. A, SHIFT TO CENTER
  - N - NO SPRING DETENTED
- (P) — MANUAL OPERATOR IN END CAP (SINGLE OPERATOR MODELS ONLY)
- (L) — LEFT HAND BUILD
- 40 — DESIGN



Sectional View DG18V-3-*C-40

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.



▲INCLUDED IN SEAL KIT 920337
■INCLUDED IN MANUAL OPERATOR AP KIT 926462
□INCLUDED IN MANUAL OPERATOR BP/FP KIT 926463
*ASSEMBLE ROUNDED FACE OF WASHER TOWARDS SPOOL
✽AVAILABLE ONLY IN KITS OF 25

SPOOL ASSEMBLY NOTE

* Assemble '0A' spool with longer end towards operator. Assemble '1' & '3' spool with narrow center land towards "A" port. Assemble '11' & '31' spool with narrow center land towards "B" port. Assemble '7A' spool with unslotted end towards operator.

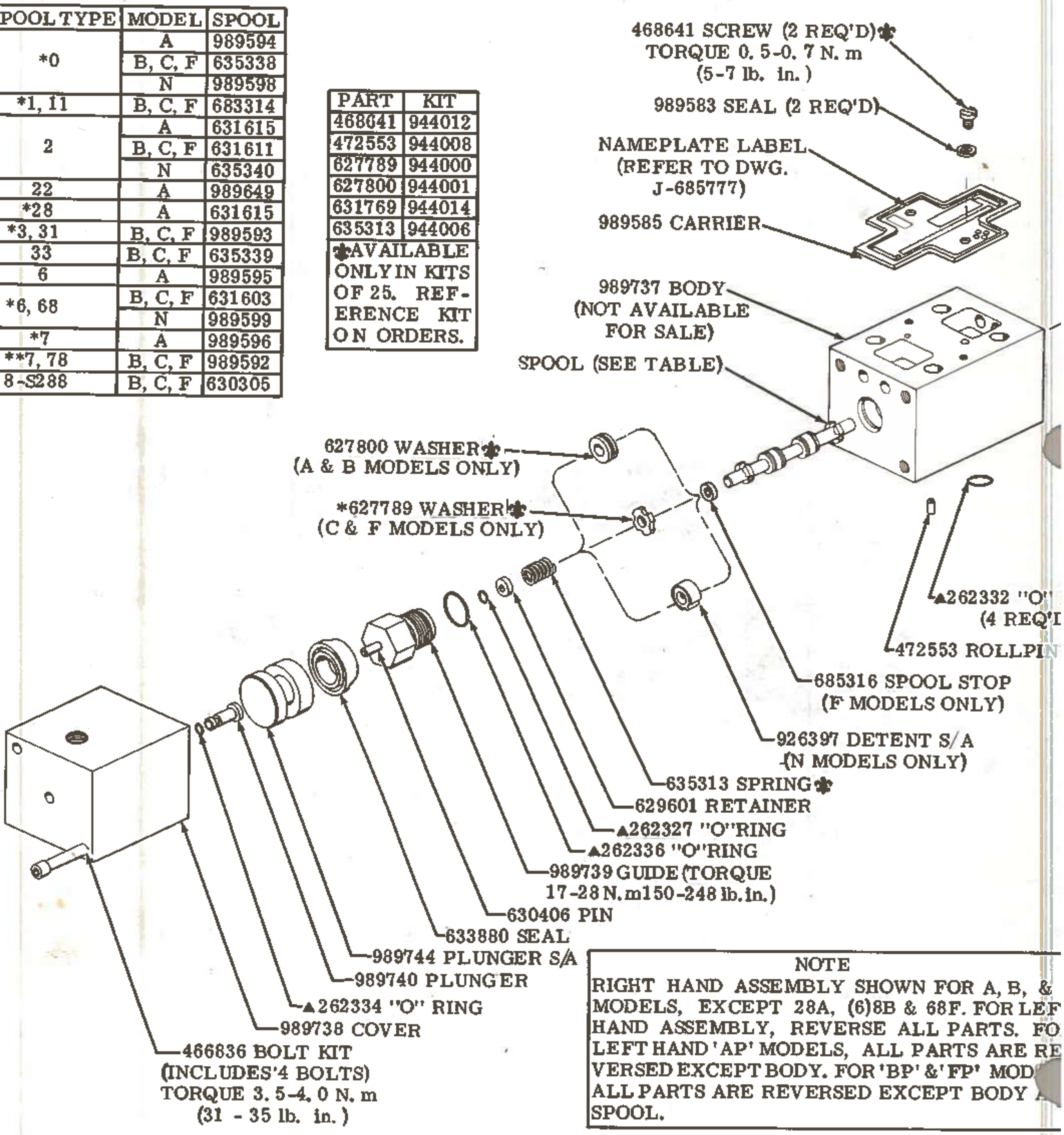
** On "B", "C" & "N" models, type '68' spool is same as type '6' spool. Type '68' spool is used as a pilot for "C" & "N" two stage valves with '4' or '8' main stage spools only. On spring centered "C" models, '78' spool is same as '7' spool. Type '78' spool is used as a pilot for "D" two stage valves with '4' or '8' type spools only.

** On "A" models, type '28' spool is same as type '2' spool. Type '28' spool is used as a pilot for spring offset two stage valves with '4' or '8' type spools only.

SPOOL TYPE	MODEL	SPOOL
*0	A	989594
	B, C, F	635338
	N	989598
*1, 11	B, C, F	683314
2	A	631615
	B, C, F	631611
	N	635340
22	A	989649
*28	A	631615
*3, 31	B, C, F	989593
33	B, C, F	635339
6	A	989595
*6, 68	B, C, F	631603
	N	989599
*7	A	989596
**7, 78	B, C, F	989592
8-S288	B, C, F	630305

PART	KIT
468641	944012
472553	944008
627789	944000
627800	944001
631769	944014
635313	944006

✤AVAILABLE ONLY IN KITS OF 25. REFERENCE KIT ON ORDERS.



NOTE

RIGHT HAND ASSEMBLY SHOWN FOR A, B, & MODELS, EXCEPT 28A, (6)8B & 68F. FOR LEF HAND ASSEMBLY, REVERSE ALL PARTS. FO LEFT HAND 'AP' MODELS, ALL PARTS ARE RE VERSED EXCEPT BODY. FOR 'BP' & 'FP' MOD ALL PARTS ARE REVERSED EXCEPT BODY SPOOL.

VICKERS®
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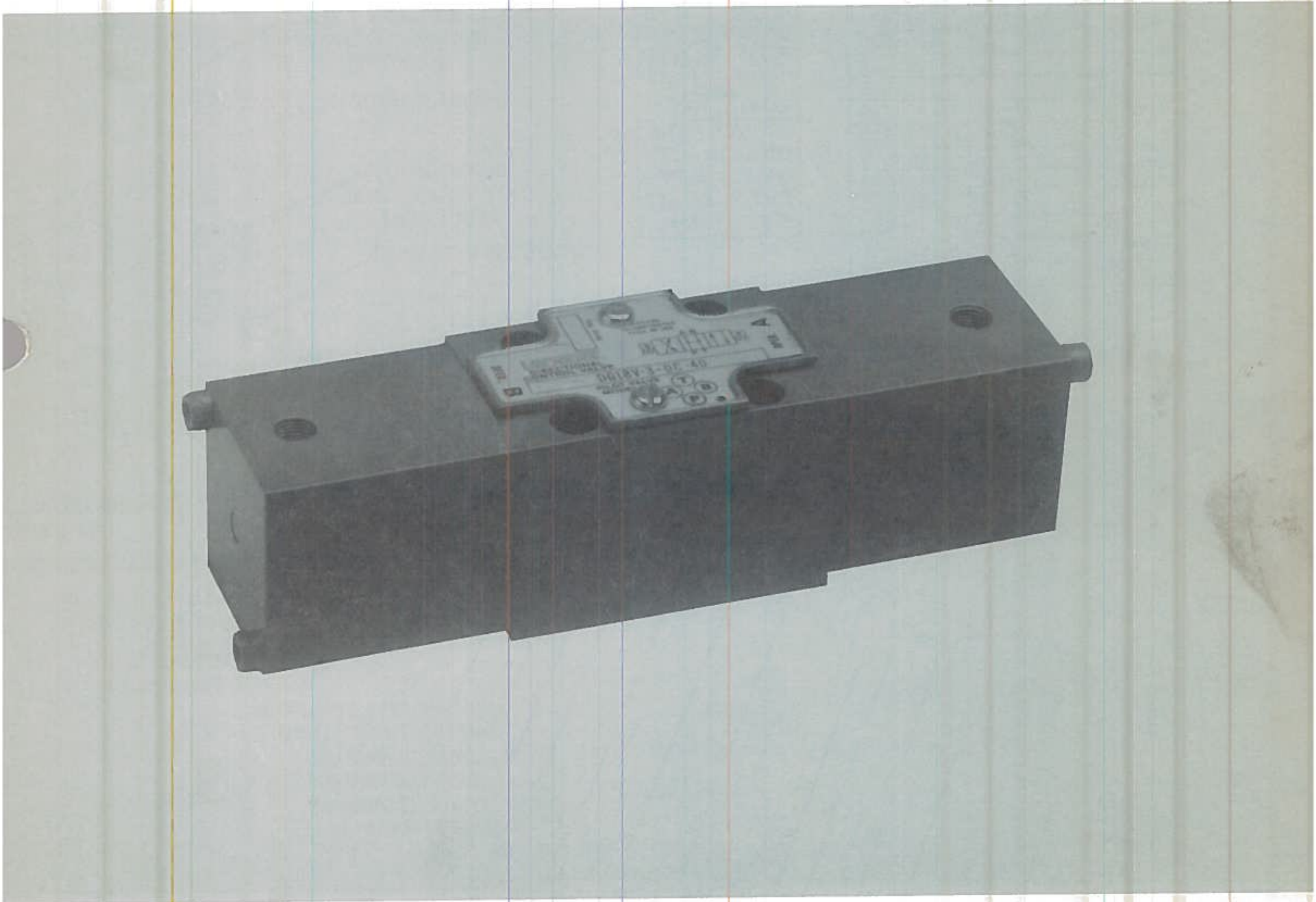
Service Parts Information

Air Pilot Operated Directional Control Valve

DG18V-3-*A(P)(L)-40
DG18V-3-*B(P)(L)-40
DG18V-3-*C-40
DG18V-3-*F(P)(L)-40
DG18V-3-*N-40



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

RELEASED 8-1-86

I-3616-S

N3

MODEL CODE BREAKDOWN

DG19S4 – 10 – * * – * – 53 – (LH)

1	2	3	4	5	6	7

1 AIR CONTROLLED, PILOT OPERATED DIRECTIONAL VALVE, SLIDING SPOOL, 4-WAY FLOW DIRECTION

2 INTERFACE

NFPA – D10 (ISO-4401-10)

3 MAIN STAGE SPOOL TYPE

4 SPOOL/SPRING ARRANGEMENT

A – SPRING OFFSET
C – SPRING CENTERED
D – PRESSURE CENTERED
N – NO SPRING DETENTED

5 MAIN STAGE OPTIONS

(REFER TO DG5S4 -10 PARTS DRWG.)

6 DESIGN

7 LEFT HAND BUILT PILOT VALVE FOR SPRING OFFSET TO CYL. 'B' MODELS ONLY

(OMIT FOR STD. SPRING OFFSET TO CYL. 'A' MODELS)

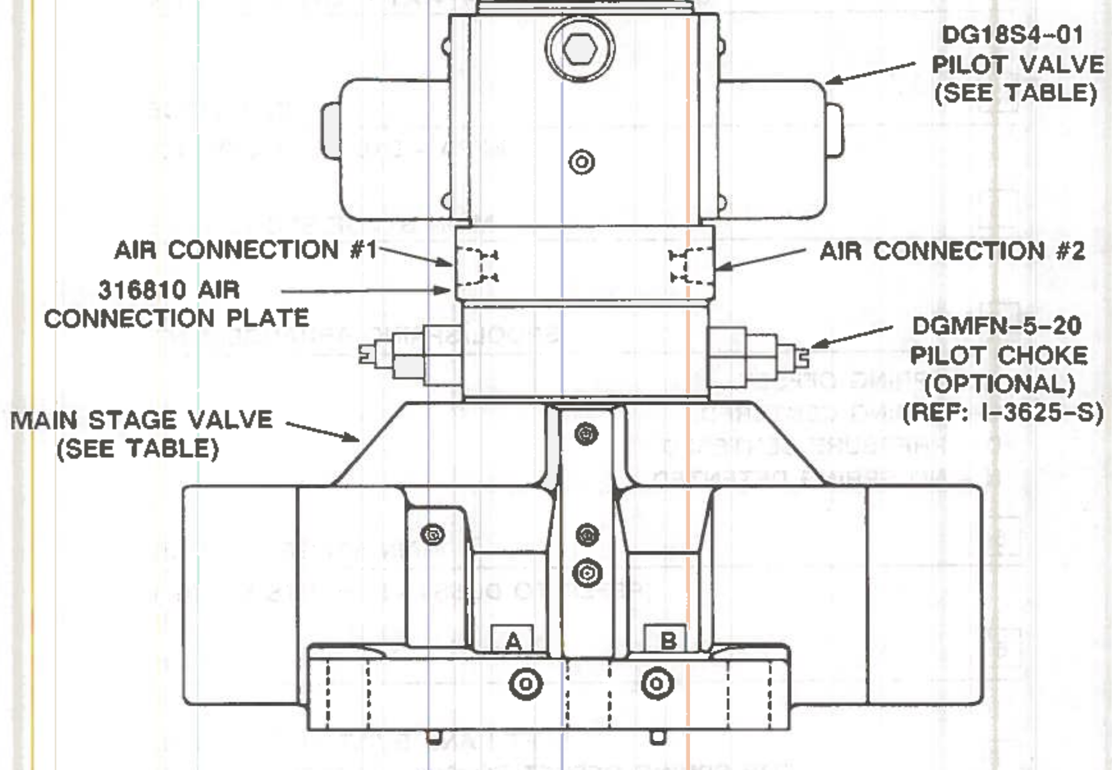
For satisfactory service life of these comonents, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS filter series are recommended.

Service Parts Information

VICKERS
A TRINOVA COMPANY

AIR CONTROLLED
PILOT OPERATED
DIRECTIONAL VALVE

DG19S4-10-**-*-53



(DG19S4 -10-*C-*-50 SHOWN)

TO MAKE MODEL	USE MAIN STAGE PORTION OF:	MAIN STAGE PARTS DRWG.	AND PILOT VALVE	PILOT VALVE PARTS DRWG.
DG19S4-10-*A-*-53	DG5S4-10*A-*-53	I-3624-S	DG18S4-0129A-52	I-3592-S
DG19S4-10-*C-*-53	DG5S4-10*C-*-53	I-3624-S	DG18S4-0169C-52	
DG19S4-10-*D-*-53	DG5S4-10*D-*-53	I-3625-S	DG18S4-0179C-52	
DG19S4-10-*N-*-53	DG5S4-10*N-*-53	I-3624-S	DG18S4-0129N-52	I-3554-S

NOTE

In addition to the parts shown in the above drawings, the following parts are required to connect the pilot valve and air connection plate to the main stage:

(4) 10935 Screws (4) 68907 Lockwasher (5) 199811 'O'ring

NOTE: If a pilot choke is used, (4) 100026 screws are used instead of (4) 10935 screws.

FOR MODELS LISTED BELOW	USE MAIN STAGE PORTION OF DG5S VALVE	DG5S PARTS DRWG.	AND AIR CONTROLLED DG18V-3-**-40 PILOT VALVE	DG18V-3 PARTS DRWG.
DG19S-H8-*A-50	DG5S-H8-*A-*-*-50	I-3868-S	DG18V-3-2A-40	I-3616-S
DG19S-H8-4/8A-50	DG5S-H8-4/8A-*-*-50		DG18V-3-28A-40	
DG19S-H8-*B-50	DG5S-H8-*B-*-*-50		DG18V-3-6B-40	
DG19S-H8-4/8B-50	DG5S-H8-4/8B-*-*-50		DG18V-3-68BL-40	
DG19S-H8-*C-50	DG5S-H8-*C-*-*-50		DG18V-3-6C-40	
DG19S-H8-4/8C-50	DG5S-H8-4/8C-*-*-50		DG18V-3-68C-40	
DG19S-H8-*F-50	DG5S-H8-*F-*-*-50		DG18V-3-6F-40	
DG19S-H8-4/8F-50	DG5S-H8-4/8F-*-*-50		DG18V-3-68F-40	
DG19S-H8-*N-50	DG5S-H8-*C-*-*-50		DG18V-3-6N-40	
DG19S-H8-4/8N-50	DG5S-H8-4/8C-*-*-50		DG18V-3-68N-40	
DG19S4-10*A-M-70	DG5S4-10*A-M-70	I-3870-S	DG18V-3-2A-40	I-3616-S
DG19S4-10*A-M-70	DG5S4-104/8A-M-70		DG18V-3-28A-40	
DG19S4-10*B-M-70	DG5S4-10*B-M-70		DG18V-3-6B-40	
DG19S4-104/8B-M-70	DG5S4-104/8B-M-70		DG18V-3-68BL-40	
DG19S4-10*C-M-70	DG5S4-10*C-M-70		DG18V-3-6C-40	
DG19S4-104/8C-M-70	DG5S4-104/8C-M-70		DG18V-3-68C-40	
DG19S4-10*N-M-70	DG5S4-10*C-M-70		DG18V-3-6N-40	
DG19S4-104/8N-M-70	DG5S4-104/8C-M-70		DG18V-3-68N-40	
DG19S4-10*D-M-70	DG5S4-10*D-**-53	I-3625-S	DG18V-3-7F-40	I-3616-S
DG19S4-104/8D-M-70	DG5S4-104/8D-**-53		DG18V-3-78F-40	

MODEL CODE BREAKDOWN

DG19S – (H) ** * * – **** – **

1 | 2 | 3 | 4 | 5 | 6 | 7

1 AIR CONTROLLED, PILOT OPERATED DIRECTIONAL VALVE

2 HIGH FLOW

(OMIT ON STD. MODELS)

3 INTERFACE

8 – NFPA-D08 (ISO-4401-08)
10 – NFPA-D10 (ISO-4401-10)

4 MAIN STAGE SPOOL TYPE

5 SPOOL/SPRING ARRANGEMENT

A – SPRING OFFSET
B – SPRING CENTERED, OPERATOR 'A' REMOVED
C – SPRING CENTERED
D – PRESSURE CENTERED (8 &10 SIZE ONLY)
F – SPRING OFFSET, SHIFT TO CENTER
N – NO SPRING DETENTED

6 MAIN STAGE OPTIONS

(REFER TO DG5S PARTS DRWG.)

7 DESIGN

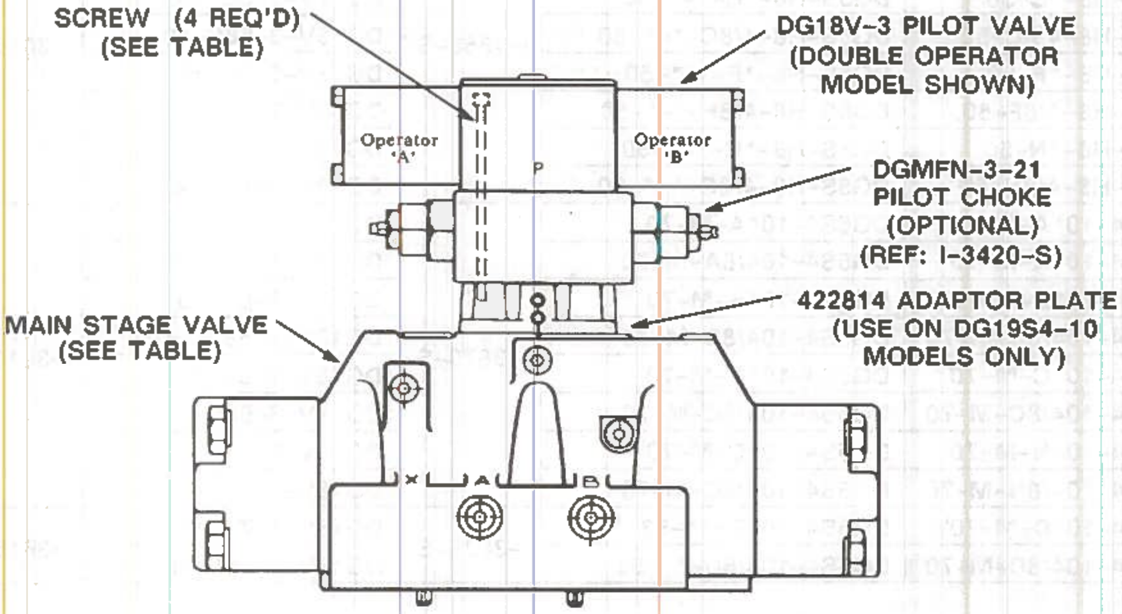
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS filter series are recommended.

Service Parts Information

VICKERS®
A TRINOVA COMPANY

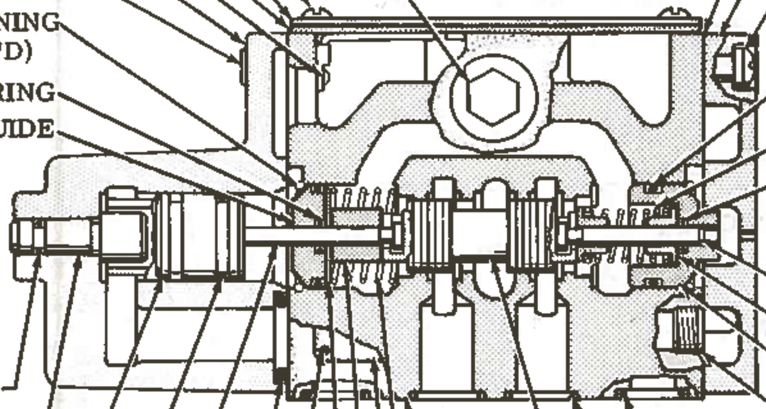
AIR CONTROLLED
PILOT OPERATED
DIRECTIONAL VALVES

DG19S-8-**-20
DG19S-H8-**-50
DG19S4-10-**-M-70



MODEL	SCREW (4 REQ'D) (W/O PILOT CHOKE)	SCREW (4 REQ'D) (WITH PLIOT CHOKE)	SCREW TORQUE
DG19S-8-**-20	473732	417413	4.5-5.7 N.m (40-50 lb. in.)
DG19S-H8-**-50			
DG19S4-10**-M-70	10932	207900	

FOR MODELS LISTED BELOW	USE MAIN STAGE PORTION OF DG5S VALVE	DG5S PARTS DRWG.	AND AIR CONTROLLED DG18V-3-**-40 PILOT VALVE	DG18V-3 PARTS DRWG.
DG19S-8-*A-20	DG5S-8-*A-*-*-20	I-3869-S	DG18V-3-2A-40	I-3616-S
DG19S-8-4/8A-20	DG5S-8-4/8A-*-*-20		DG18V-3-28A-40	
DG19S-8-*B-20	DG5S-8-*B-*-*-20		DG18V-3-6B-40	
DG19S-8-4/8B-20	DG5S-8-4/8B-*-*-20		DG18V-3-68BL-40	
DG19S-8-*C-20	DG5S-8-*C-*-*-20		DG18V-3-6C-40	
DG19S-8-4/8C-20	DG5S-8-4/8C-*-*-20		DG18V-3-68C-40	
DG19S-8-*F-20	DG5S-8-*F-*-*-20		DG18V-3-6F-40	
DG19S-8-4/8F-20	DG5S-8-4/8F-*-*-20		DG18V-3-68F-40	
DG19S-8-*N-20	DG5S-8-*C-*-*-20		DG18V-3-6N-40	
DG19S-8-4/8N-20	DG5S-8-4/8C-*-*-20		DG18V-3-68N-40	
DG19S-8-*D-20	DG5S-8-*D-*-*-20	I-3873-S	DG18V-3-7F-40	I-3616-S
DG19S-8-4/8D-20	DG5S-8-4/8D-*-*-20		DG18V-3-78F-40	



MODEL	SPOOL	DIAGRAM PLATE
DG18S2-012A-52	289186	578460
DG18S2-012A-52LH		578461
DG18S4-010A-52	213230	578462
DG18S4-012A-52	213231	578462
DG18S4-0129A-52	*213231	578463
DG18S4-0129A-52LH		578465

* TYPE 29 SPOOL IS FOR USE AS PILOT FOR SPRING OFFSET TWO STAGE VALVES ONLY.

USE DIAGRAM PLATE 578464 FOR DG18S4L. H. MODELS WITH A "0" OR "2" SPOOL.

▲INCLUDED IN 919681 SEAL KIT

R. H. ASSY SHOWN. THE BODY IS REVERSED FOR L. H. ASSY.

MODEL CODE BREAKDOWN

D G 18S*-01-52(LH)**

- DIRECTIONAL VALVE
- SUBPLATE MOUNTED
- AIR OPERATED
- SLIDING SPOOL
- FLOW DIRECTIONS
  - 2 - 2 WAY
  - 4 - 4 WAY
- SERIES
- SPOOL TYPE
- A - SPRING OFFSET
  C - SPRING CENTERED
- DESIGN
- LEFT HAND ASSEMBLY POSSIBLE ON SPRING OFFSET MODELS ONLY

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

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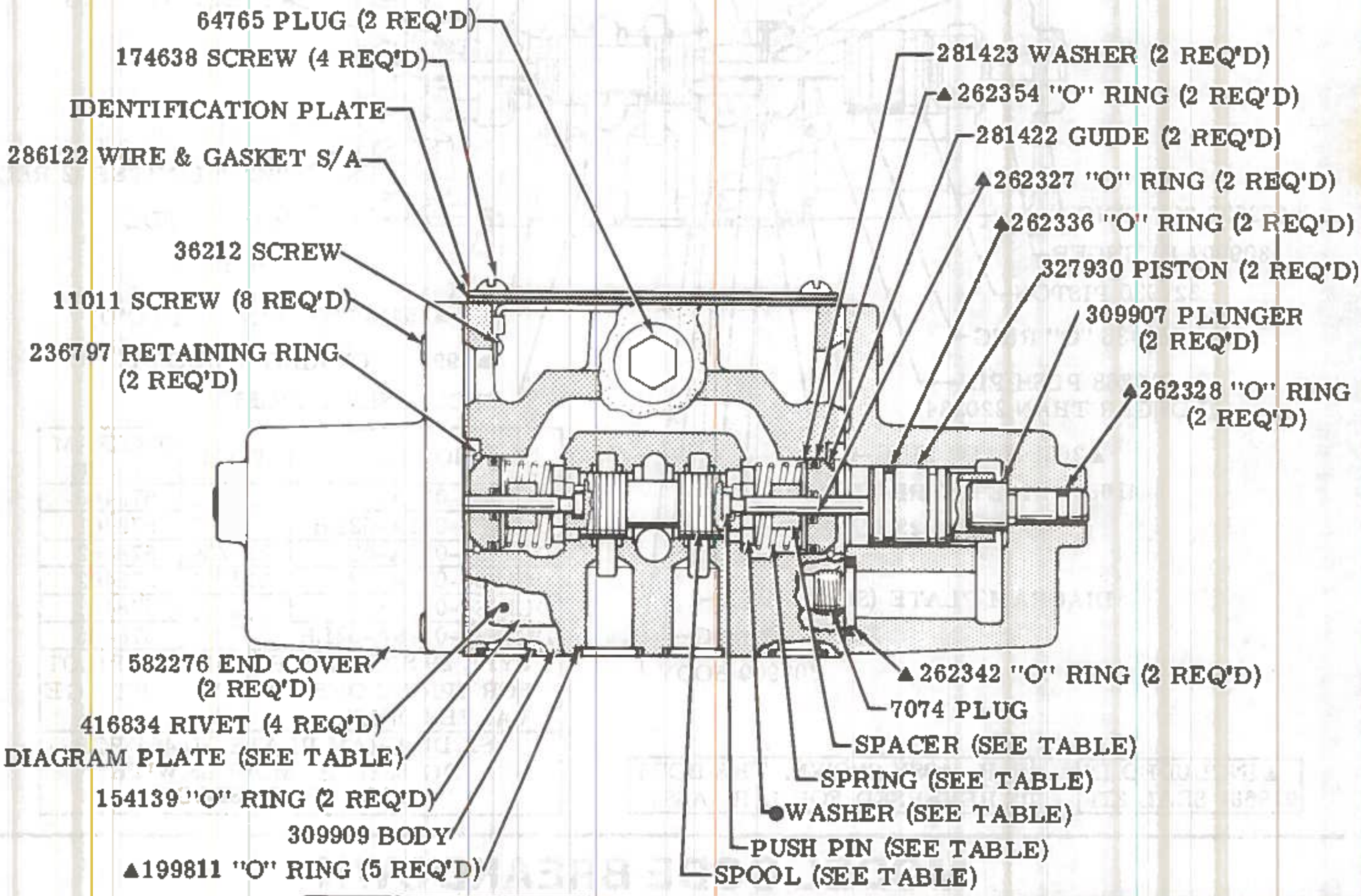
AIR OPERATED DIRECTIONAL VALVE

DG18S4-01**C-52
DG18S2-01**A-52
DG18S4-01**A-52



MODEL	SPOOL	WASHER (2 REQ'D)	SPRING (2 REQ'D)	SPACER (2 REQ'D)	PUSH PIN (2 REQ'D)	DIAGRAM PLATE
DG18S4-010C-52	213230					578447
DG18S4-011C-52	276278					578448
DG18S4-012C-52	213231					578449
DG18S4-013C-52	239903	211846	290072	213273	213268	578450
DG18S4-016C-52	213232					578451
DG18S4-017C-52	236624					578453
DG18S4-018C-52	235637	283637	217323	297745	290264	578455
DG18S4-0133C-52	236615					578456
DG18S4-0169C-52	**213232	211846	290072	213273	213268	578452
DG18S4-0179C-52	***236624					578454

** TYPE '69' SPOOL IS FOR USE AS PILOT FOR SPRING CENTERED TWO STAGE VALVES ONLY.

*** TYPE '79' SPOOL IS FOR USE AS PILOT FOR PRESSURE CENTERED TWO STAGE VALVES ONLY.

▲INCLUDED IN 919681 SEAL KIT

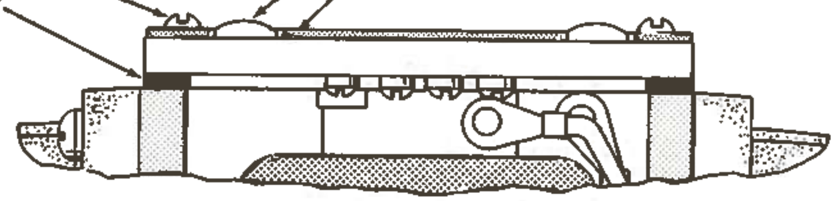
●ASSEMBLE ON SPOOL WITH SHARP EDGE FACING SPRING.

MODEL CODE BREAKDOWN

(F3)-DG4S4*-01*F-W3-*-50-(LH)

- (F3) — SEALS FOR MINERAL OIL & FIRE RESISTANT FLUIDS
- D — DIRECTIONAL VALVE
- G — MANIFOLD OR SUBPLATE MOUNTING
- 4 — SOLENOID OPERATED
- S — SLIDING SPOOL
- 4 — FLOW DIRECTION 4 - WAY
- * — SOLENOID INDICATOR LIGHTS
  L - LIGHT
  (OMITTED - NONE)
- 01 — SERIES
- * — SPOOL TYPE
- F — SPRING OFFSET TO CYL. "A" SPOOL TRAVEL TO CENTER
- W3 — WET ARMATURE TYPE SOLENOID
  W - NON-SERVICEABLE CORE TUBE S/A
  W3 - SERVICEABLE CORE TUBE S/A
- * — COIL IDENTIFICATION LETTER
- 50 — DESIGN
- (LH) — LEFT HAND BUILT (OMIT FOR STD. R.H. MODELS)

FOR MODELS WITH
SOLENOID INDICATOR LIGHTS



SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617

NOTE
REFER TO PARTS DRAWING I-3487-S
FOR MODELS WITH PLUG-IN FEATURE.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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VICKERS

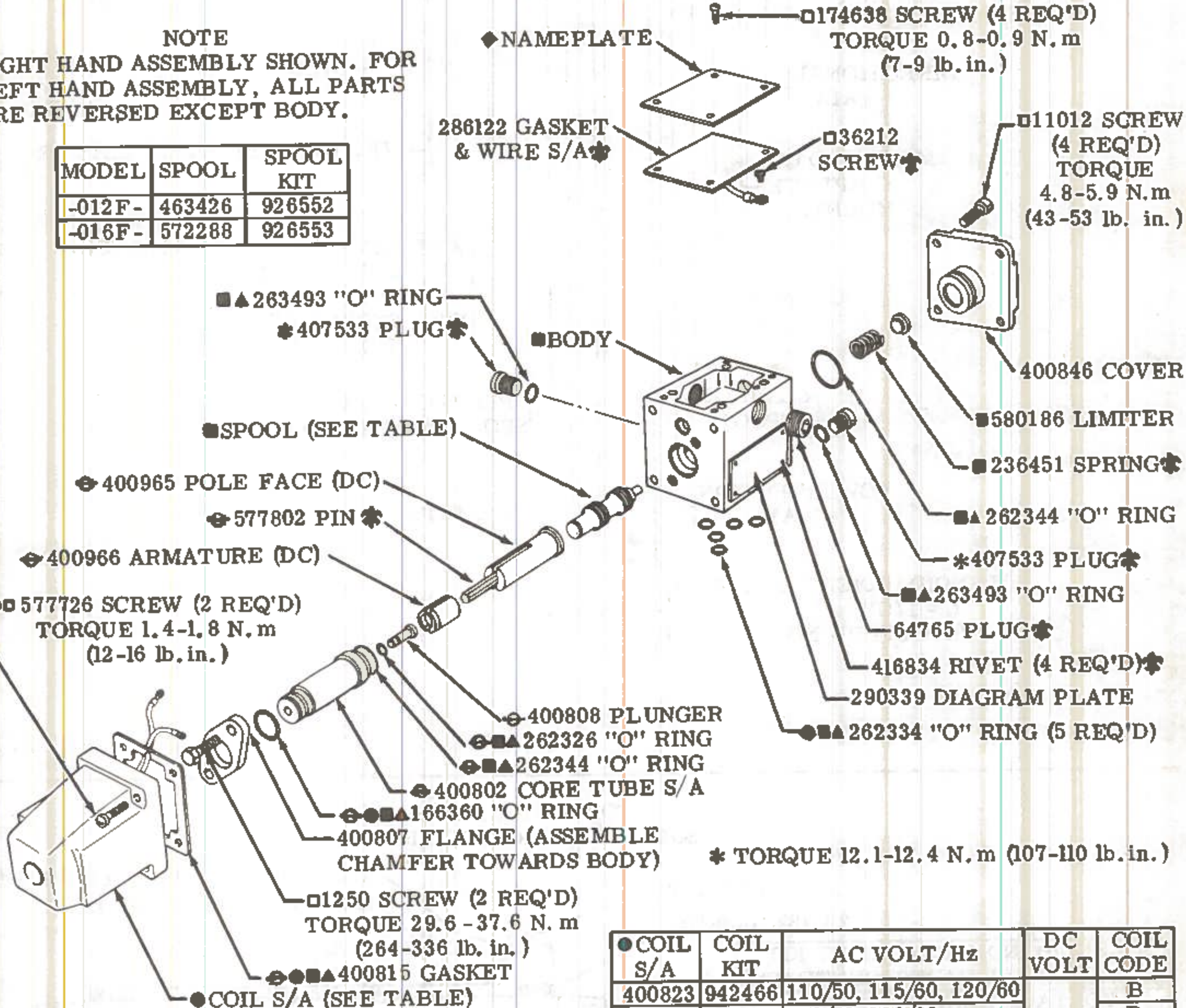
WET ARMATURE SPRING OFFSET DIRECTIONAL VALVE

Service Parts Information

(F3)DG4S4-01*F-W3-*-50(LH)

NOTE
RIGHT HAND ASSEMBLY SHOWN. FOR LEFT HAND ASSEMBLY, ALL PARTS ARE REVERSED EXCEPT BODY.

MODEL	SPOOL	SPOOL KIT
-012F-	463426	926552
-016F-	572288	926553



●COIL S/A	COIL KIT	AC VOLT/Hz	DC VOLT	COIL CODE
400823	942466	110/50, 115/60, 120/60		B
400824	942467	220/50, 230/60	—	D
400825	942468	440/50, 460/60		M
400826	942469	—	12	G
400827	942470		24	H
435755	941017	127/50	—	EG
582214	941109	—	250	X
730273	926461		48	J

CAUTION
CORRECT CORE TUBE S/A MUST BE USED FOR AC AND DC OPERATION

- ■ INCLUDED IN SPOOL KIT
- □ INCLUDED IN FASTENER KIT 942465
- ▲ INCLUDED IN F3 SEAL KIT 920109
- ⊖ INCLUDED IN SERVICEABLE 'DC' CORE TUBE S/A KIT 926551 NON-SERVICEABLE 'AC' CORE TUBE S/A 587259
- ● INCLUDED IN COIL KIT
- ✱ AVAILABLE ONLY IN KITS OF 25 EACH
- ◆ NOT AVAILABLE FOR SALE

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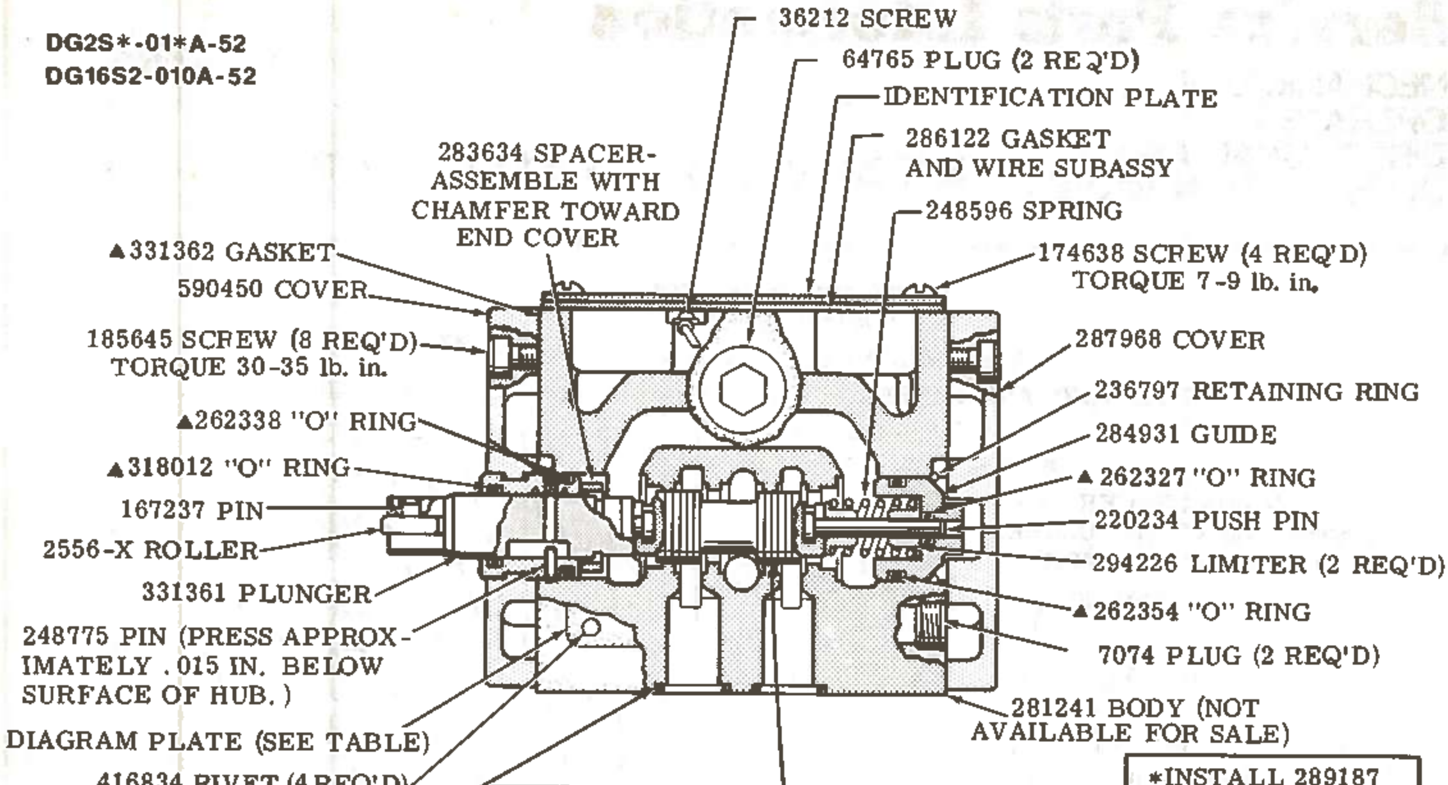
RELEASED 4-1-86

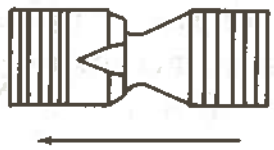
DG2S*-01*A-52
DG16S2-010A-52



MODEL	SPOOL	DIAGRAM PLATE	
		L. H.	R. H.
DG2S2-012A-52	289186	578491	578490
DG2S4-010A-52	213230	578493	578492
DG2S4-012A-52	213231		
DG2S4-016A-52	213232		
DG2S4-017A-52	236624		
DG2S4-0133A-52	236615		
DG16S2-010A-52	289187	578494	

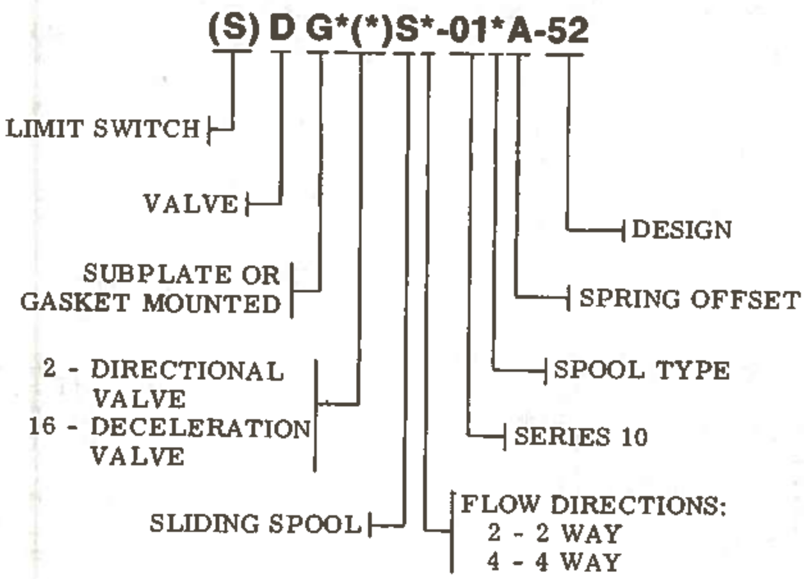
▲SERVICE ALL UNITS W/F3 SEAL KIT 919432

*INSTALL 289187 SPOOL THIS WAY



TOWARDS OPERATING STEM

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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Service Parts Information

MECHANICALLY OPERATED DIRECTIONAL AND DECELERATION VALVES

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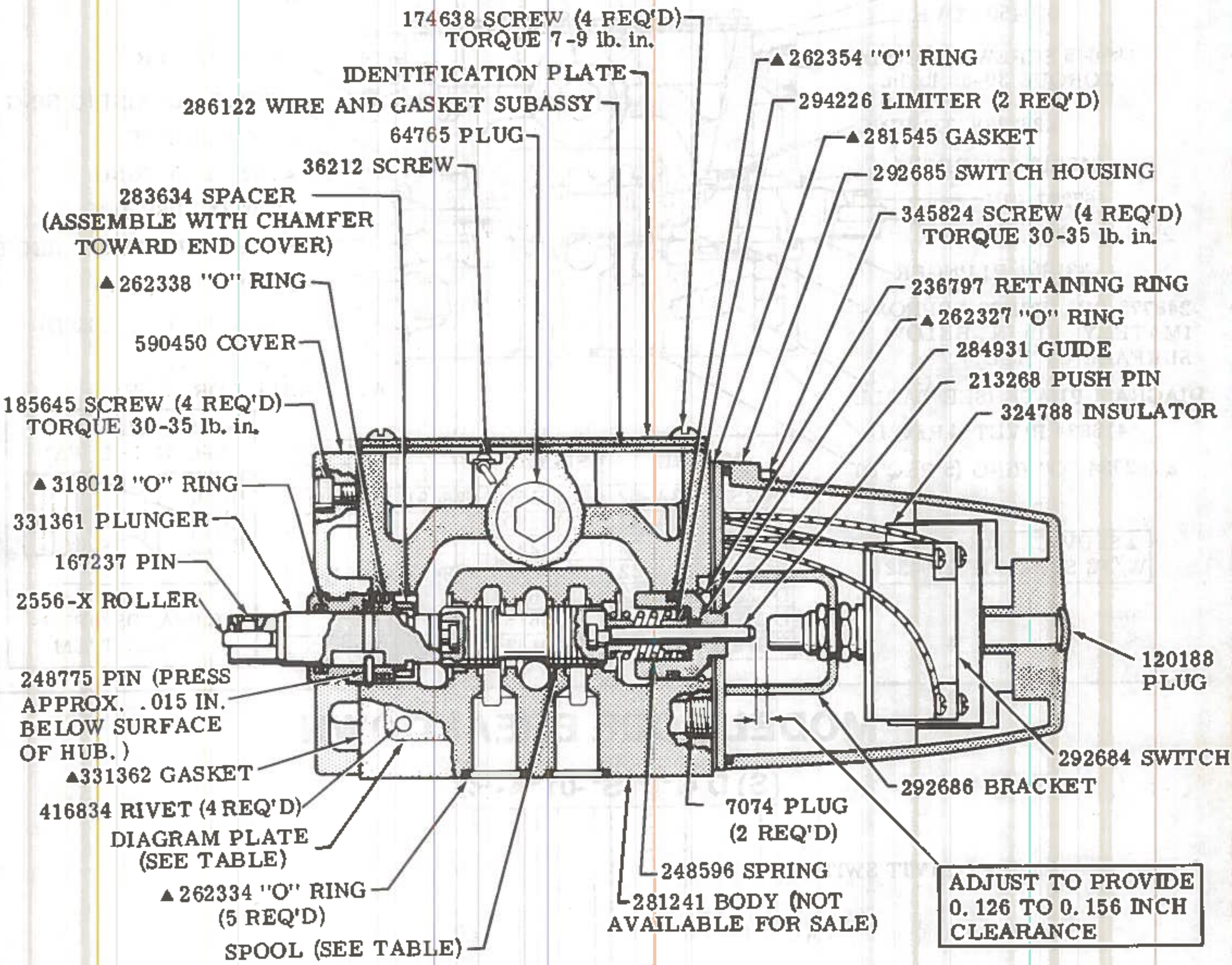
SDG2S*-012A-52 DG2S*-01*A-52 DG16S2-010A-52

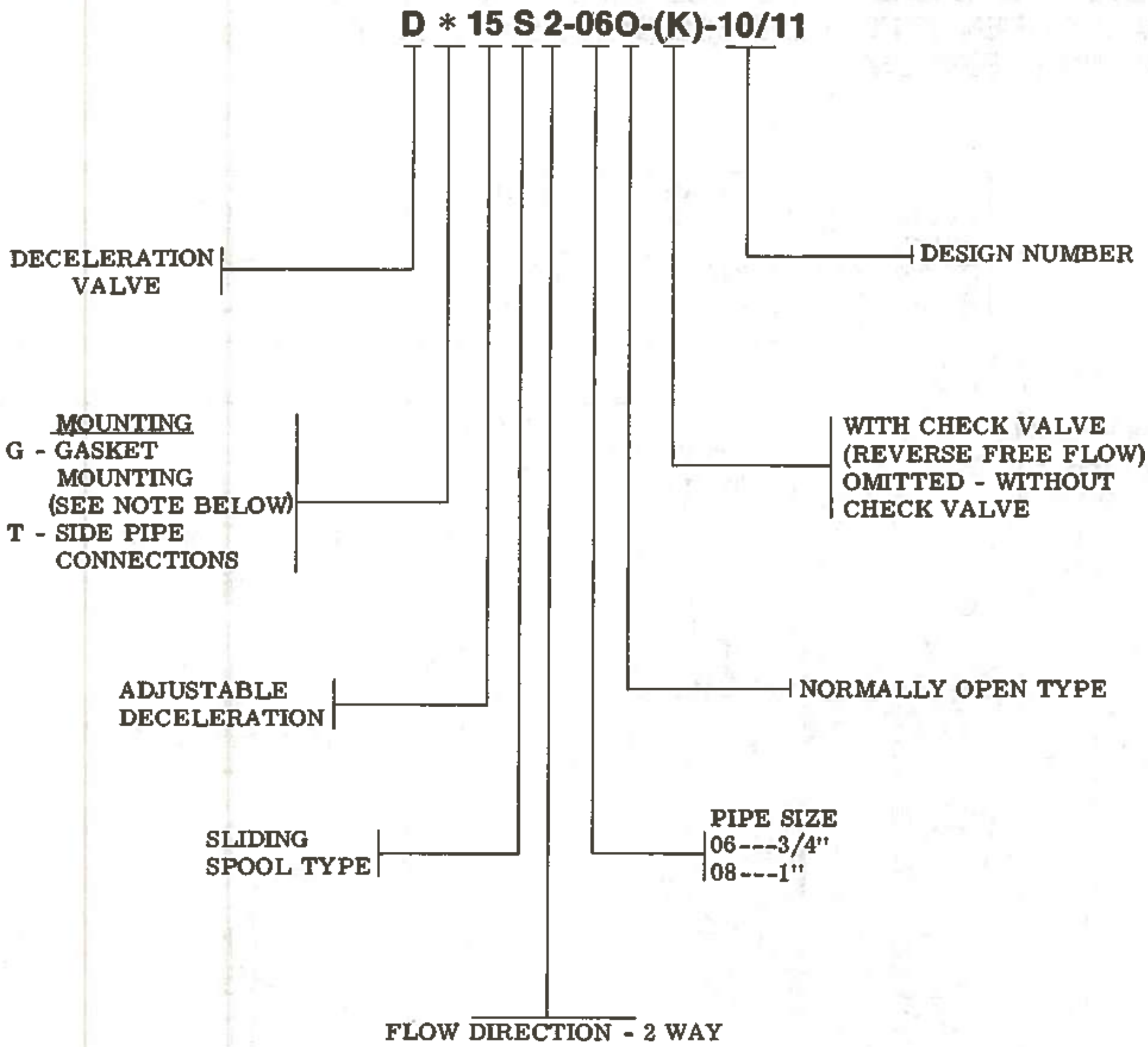


▲SERVICE ALL UNITS W/F3 SEAL KIT 919432

MODEL	SPOOL	DIAGRAM PLATE L. H.	DIAGRAM PLATE R. H.
SDG2S2-012A-52(LH)	238966	578491	578490
SDG2S4-010A-52(LH)	213230	578493	578492
SDG2S4-012A-52(LH)	213231		
SDG2S4-016A-52(LH)	213232		
SDG2S4-017A-52(LH)	236624		

RIGHT HAND ASSEMBLY SHOWN. IN LEFT HAND ASSEMBLY ALL PARTS OF VALVE EXCEPT BODY ARE REVERSED. EXAMPLE OF L. H. MODEL: SDG2S2-012A-52-L. H.

MODEL CODE BREAKDOWN



NOTE: MOUNTING SUB-PLATES FOR THE GASKET MOUNTED SERIES:		
SUB-PLATE	PORT SIZE	BOLT KIT BKDG15-06-627
DG15SM-06-10 DG15M-08-10	3/4" NPT 1" NPT	CONSISTS OF 4 1078-A SCREWS

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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Service Parts Information

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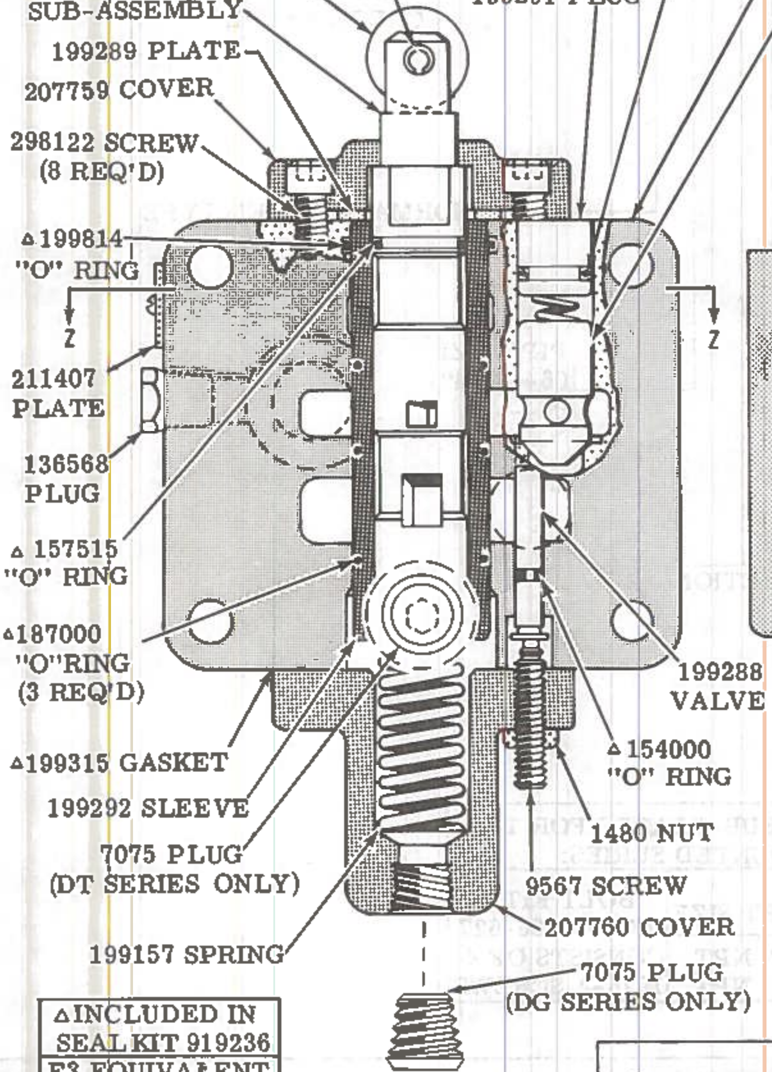
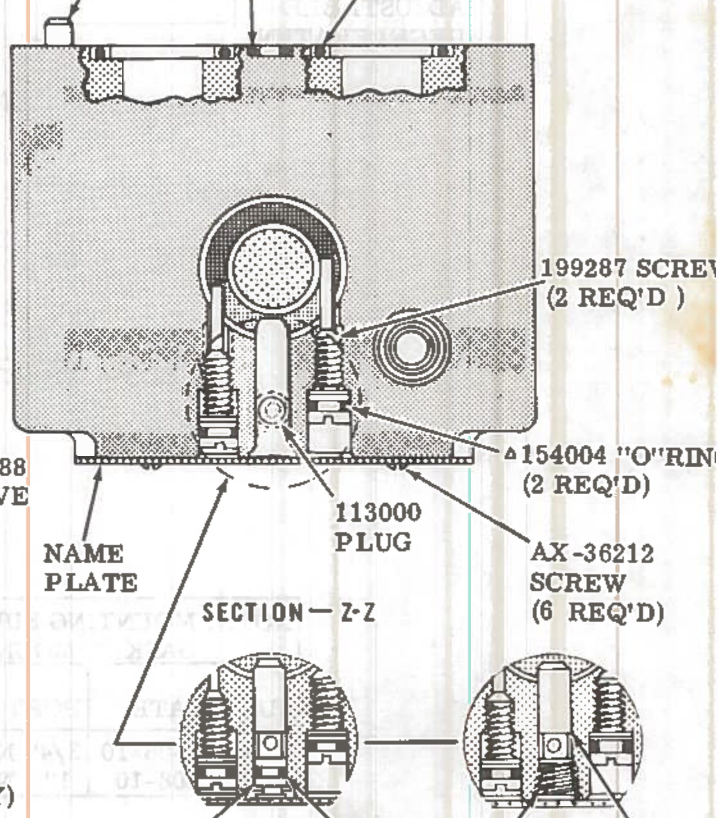
**DECELERATION VALVES
NORMALLY OPEN TYPE
3/4" NOMINAL PIPE SIZE**

DG15S2 Series Gasket Mounted
DT15S2 Series Side Pipe Thd. Conn.

MODEL SERIES	BODY -10 DESIGN	BODY -11 DESIGN	POPPET	SPRING	PLUG	SEAL
DG15S2-060-K	207761	361130	118-X	20636	——	——
DT15S2-060-K	207764	361131				
DG15S2-060	207761	361130	——	——	211768	▵154006
DT15S2-060	207764	361131				



USED ON DG15S2- SERIES ONLY		
PIN	SEAL	SEAL (2REQ'D)
160571	154006	▵154019



▵INCLUDED IN SEAL KIT 919236
F3 EQUIVALENT 919253

MODEL SERIES	-10 DESIGN LOCATOR	-10 DESIGN "O"RING	-11 DESIGN PLUG	-11 DESIGN LOCATOR
D*15S2-060-(K)	201955	▵154002	7074	361125

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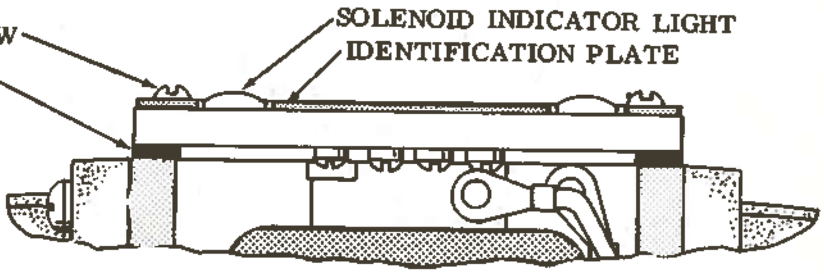
MODEL CODE BREAKDOWN

(F3)-DG4S4*-01*C-W3-BB-50-S410

- (F3) — SEALS FOR MINERAL OIL & FIRE RESISTANT FLUIDS
- D — DIRECTIONAL VALVE
- G — MANIFOLD OR SUBPLATE MOUNTING
- 4 — SOLENOID OPERATED
- S — SLIDING SPOOL
- 4 — FLOW DIRECTION 4 - 4 WAY
- * — SOLENOID INDICATOR LIGHTS L - LIGHT (OMITTED - NONE)
- 01 — SERIES (NFPA-D02 INTERFACE)
- * — SPOOL TYPE
- C — SPRING CENTERED
- W3 — WET ARMATURE TYPE SOLENOID W3 - SERVICEABLE CORE TUBE S/A
- BB — SPECIAL SOLENOID (115 VAC 60 Hz)
- 50 — DESIGN NUMBER
- S410 — SMOOTH SHIFT

FOR MODELS WITH
SOLENOID INDICATOR LIGHTS



SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615

NOTE
REFER TO PARTS DRAWING I-3487-S
FOR MODELS WITH PLUG-IN FEATURE.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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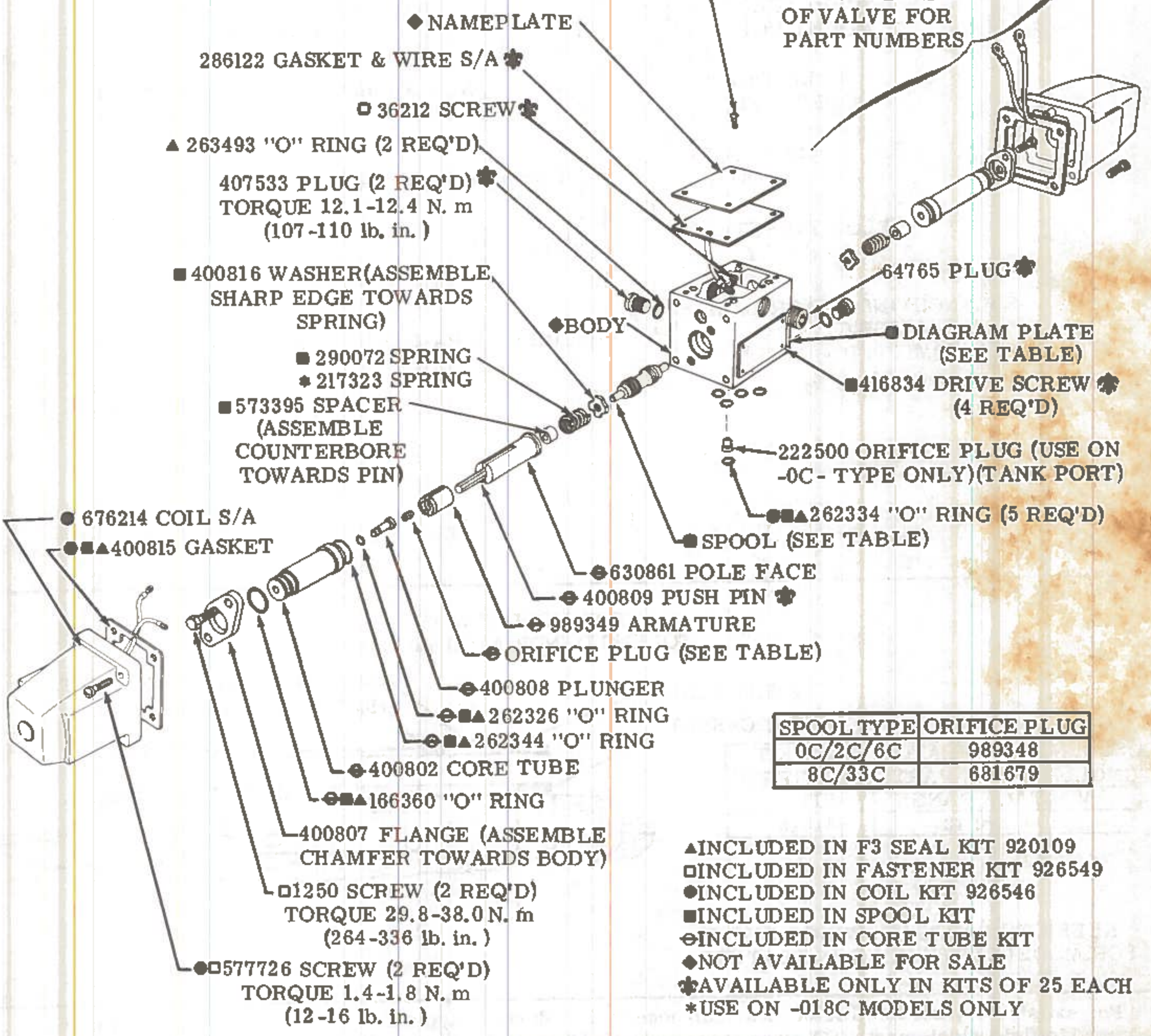
SMOOTH SHIFT WET ARMATURE DIRECTIONAL VALVE

Service Parts Information

(F3)DG4S4-01*C-W3-BB-50-S410

MODEL	SPOOL	DIAGRAM PLATE	■ SPOOL KIT	⊖ CORE TUBE KIT
DG4S4-010C	463385	290341	940711	926547
DG4S4-012C	463387	290343	940713	926547
DG4S4-016C	463389	290345	940715	926547
DG4S4-018C	463391	290340	940717	926548
DG4S4-0133C	463392	577484	940718	926548



SPOOL TYPE	ORIFICE PLUG
0C/2C/6C	989348
8C/33C	681679

▲INCLUDED IN F3 SEAL KIT 920109
□INCLUDED IN FASTENER KIT 926549
●INCLUDED IN COIL KIT 926546
■INCLUDED IN SPOOL KIT
⊖INCLUDED IN CORE TUBE KIT
◆NOT AVAILABLE FOR SALE
✽AVAILABLE ONLY IN KITS OF 25 EACH
∗USE ON -018C MODELS ONLY

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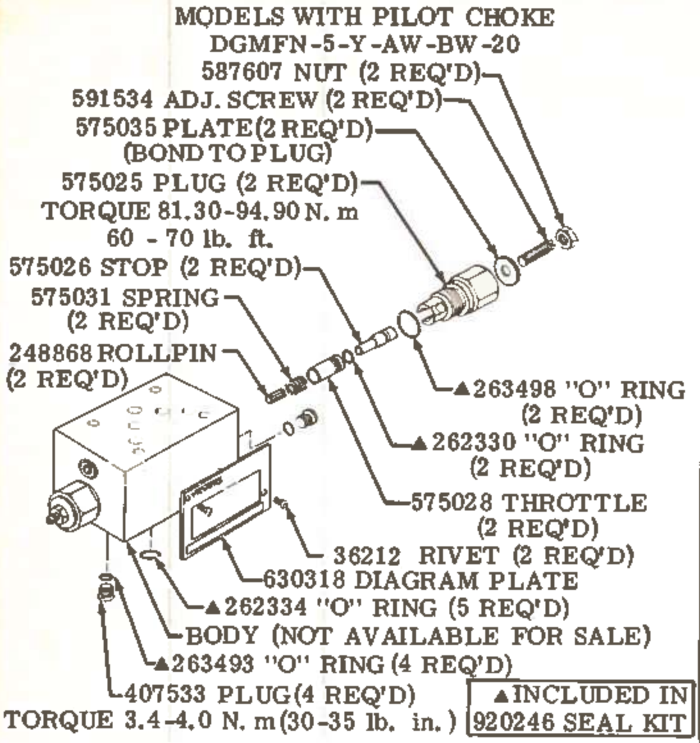
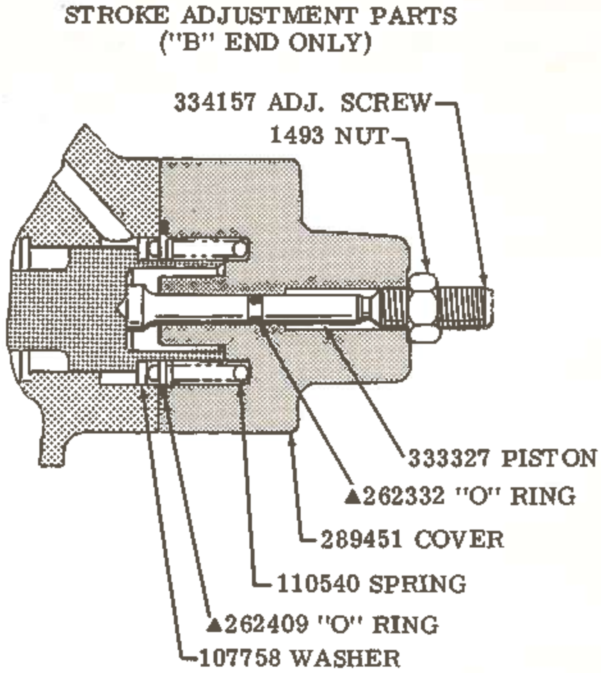


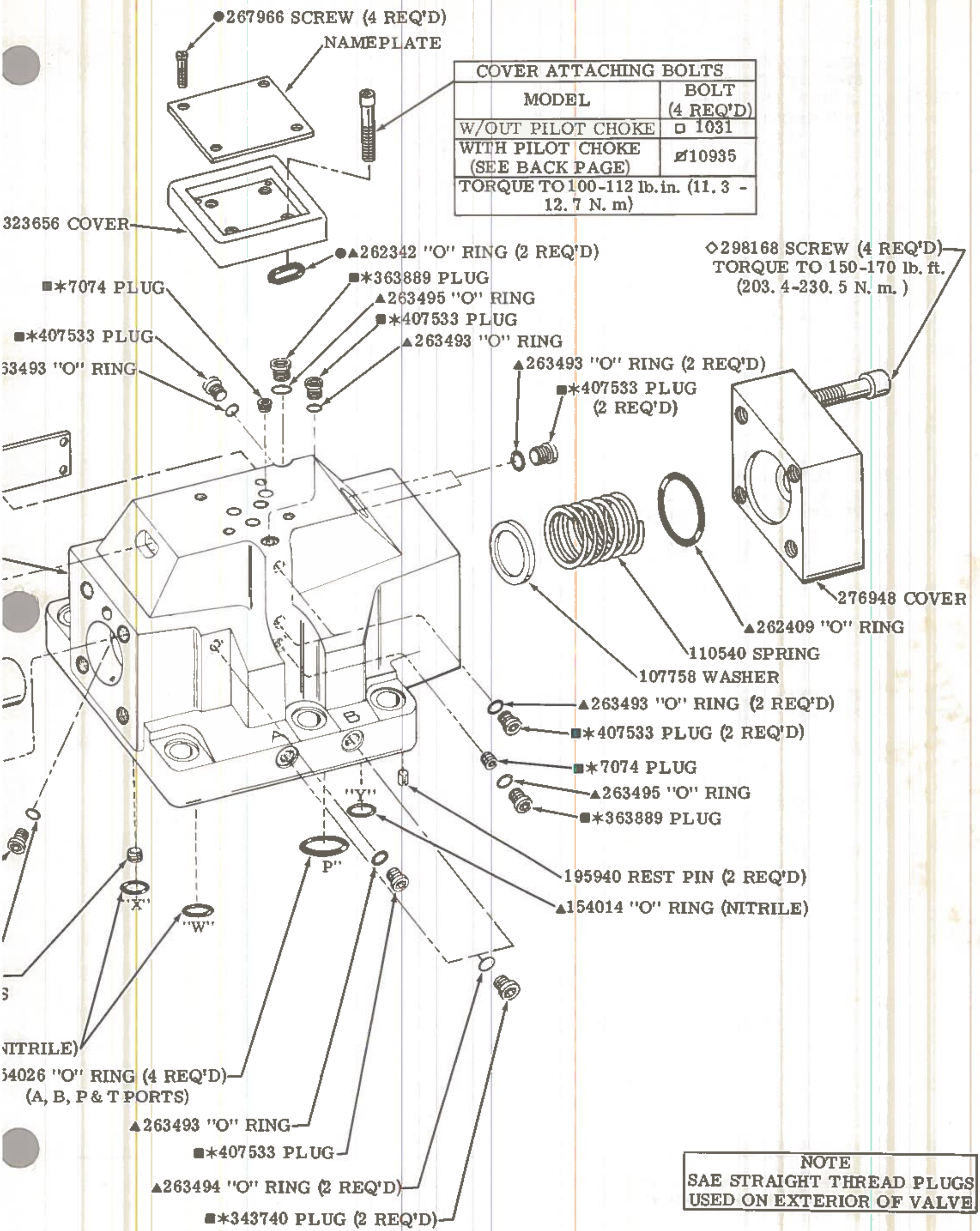


MODEL CODE BREAKDOWN

(F3) - D G 3 S 4 - 10 * D (X) - * - 53

- (F3) — SEALS FOR MINERAL OIL OR FIRE RESISTANT FLUID
- D — DIRECTIONAL VALVE
- G — SUBPLATE OR MANIFOLD MOUNTED
- 3 — PILOT OPERATED
- S — SLIDING SPOOL
- 4 — FLOW DIRECTIONS
  4 - 4 WAY
- 10 — SERIES 100 (1. 250 INCH)
- * — SPOOL TYPE
- D — PRESSURE CENTERED
- (X) — X - FAST RESPONSE MODEL
  OMITTED - STD LOW SHOCK MODELS
- * — SPOOL CONTROL MODIFICATION (OMIT IF NOT REQUIRED)
  2 - PILOT CHOKE ADJS.
  8 - STROKE ADJUSTMENT CYLINDER "B" END ONLY
  2-8 - IF BOTH ARE REQUIRED
- 53 — DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.



COVER ATTACHING BOLTS	
MODEL	BOLT (4 REQ'D)
W/OUT PILOT CHOKE	□ 1031
WITH PILOT CHOKE (SEE BACK PAGE)	⌀10935
TORQUE TO 100-112 lb. in. (11. 3 - 12. 7 N. m)	

NOTE
SAE STRAIGHT THREAD PLUGS USED ON EXTERIOR OF VALVE

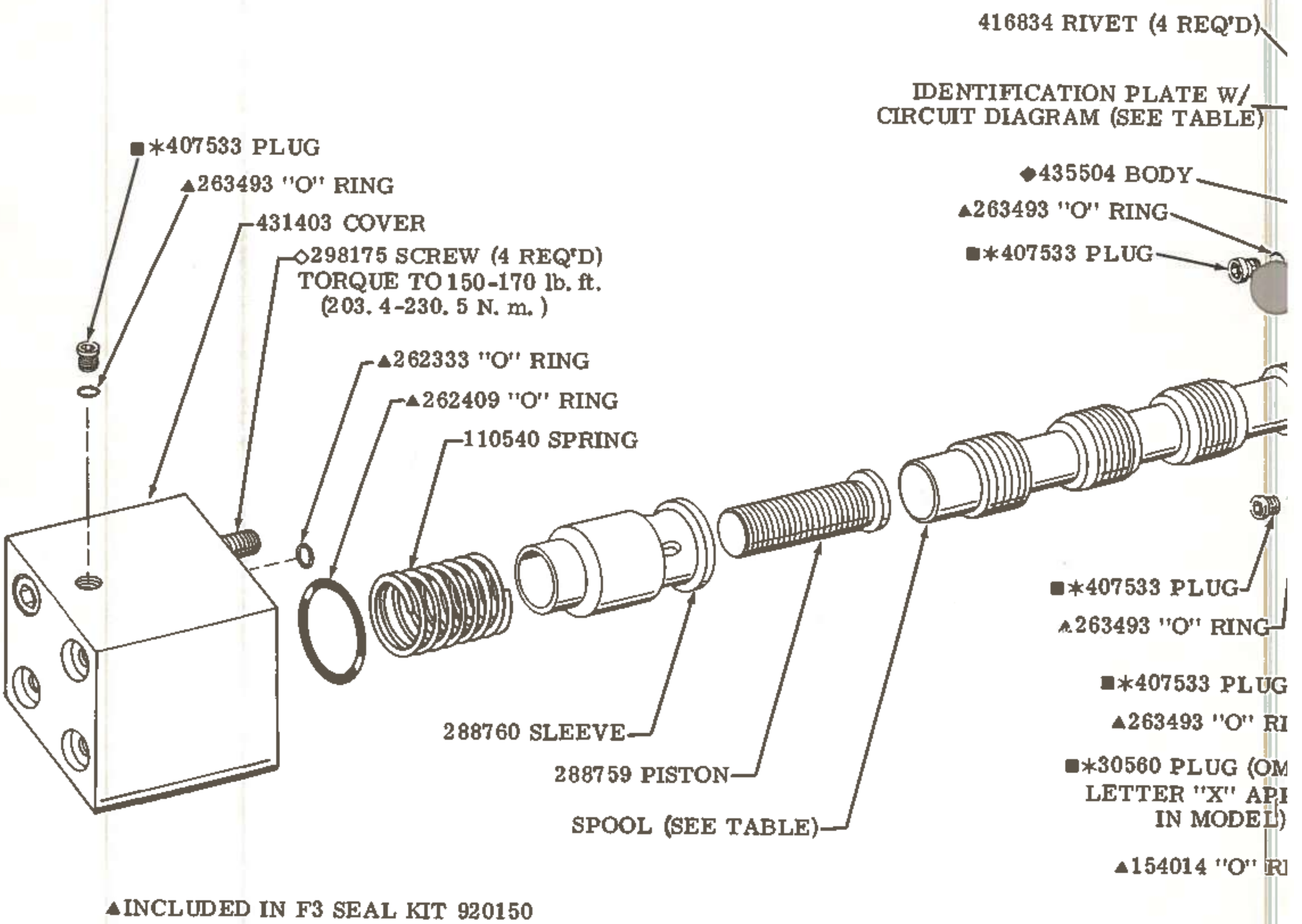
MODEL	SPOOL	DIAGRAM PLATE
DG3S4-100D(X)-*-53	364037	400967
DG3S4-101D(X)-*-53	*331404	400968
DG3S4-102D(X)-*-53	364038	400969
DG3S4-103D(X)-*-53	*277479	400970
DG3S4-104D(X)-*-53	281193	400971
DG3S4-106D(X)-*-53	364039	400972
DG3S4-108D(X)-*-53	364041	400971
DG3S4-109D(X)-*-53	277563	400967
DG3S4-1033D(X)-*-53	364042	400972

■ PLUG TORQUES (OILED)		
PLUG	N. m.	lb. in.
7074	8.5 - 9.6	75-85
30560		
343740	10.0 -11.8	90-105
363889	16.9 -18.0	150-160
407533	3.4 - 4.0	30-35

NOTE
PARTS INCLUDED IN SERVICE KITS NOT SOLD SEPARATELY

*SPOOL ASSEMBLY NOTE
ASSEMBLE TYPE 1 & 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END IS DEFINED AS BEING CLOSEST TO CYLINDER PORT "A".

SEAL KIT NOTE
The -53 design valves are manufactured as shown with F3 seals used internally. Interface seals are standard Nitrile material and are converted to F3 in the seal kit. All seals in the seal kit are F3.



▲INCLUDED IN F3 SEAL KIT 920150
□INCLUDED IN FASTENER KIT 941257
☒INCLUDED IN BOLT KIT 255620
◇INCLUDED IN FASTENER KIT 941273
*INCLUDED IN PLUG KIT 941263
●INCLUDED IN COVER KIT 942024
■PLUG TORQUES (SEE TABLE)
◆NOT AVAILABLE FOR SALE

Service Parts Information

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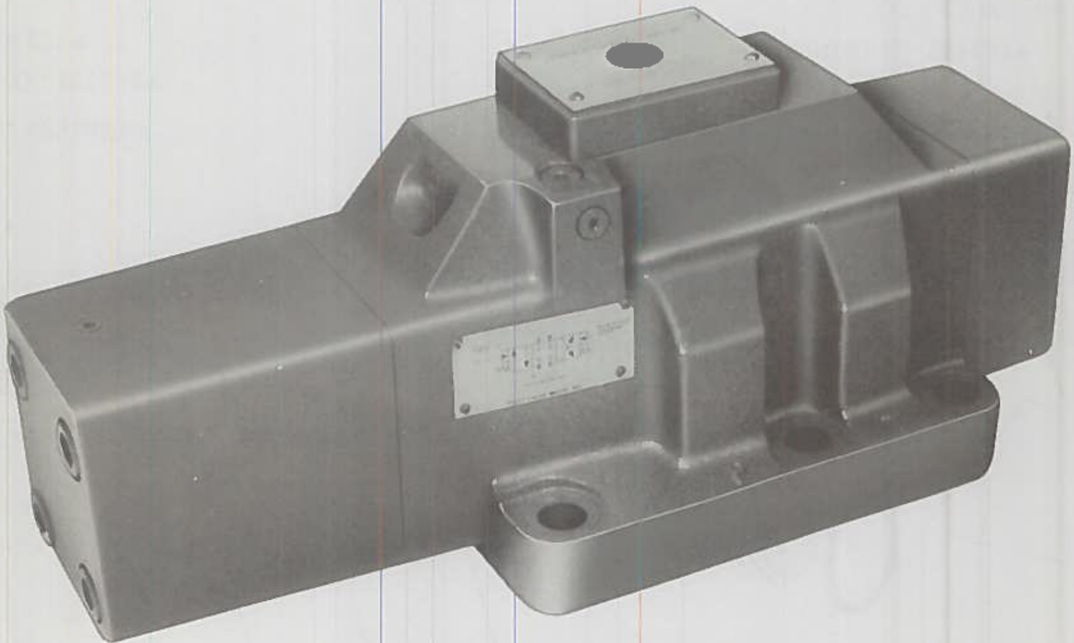
DG3S4-10*D*-*-53

Pressure Centered Pilot Operated Directional Control Valves



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Revised 11-1-85

I-3569-S

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MODEL CODE BREAKDOWN

(F3) D G 17 S 4 - 10 ** - 53

- (F3) — MULTI-FLUID CAPABILITY (VITON SEALS)
- D — DIRECTIONAL CONTROL VALVE
- G — MANIFOLD OR SUBPLATE MOUNTED
- 17 — MANUAL LEVER OPERATED
- S — SLIDING SPOOL
- 4 — FLOW DIRECTIONS 4 - 4 WAY
- 10 — VALVE SIZE 100 SERIES (1. 250 INCH)
- * — SPOOL TYPES
- * — VALVE TYPE
  - A - SPRING OFFSET
  - C - SPRING CENTERED
  - N - NO-SPRING DETENTED
- 53 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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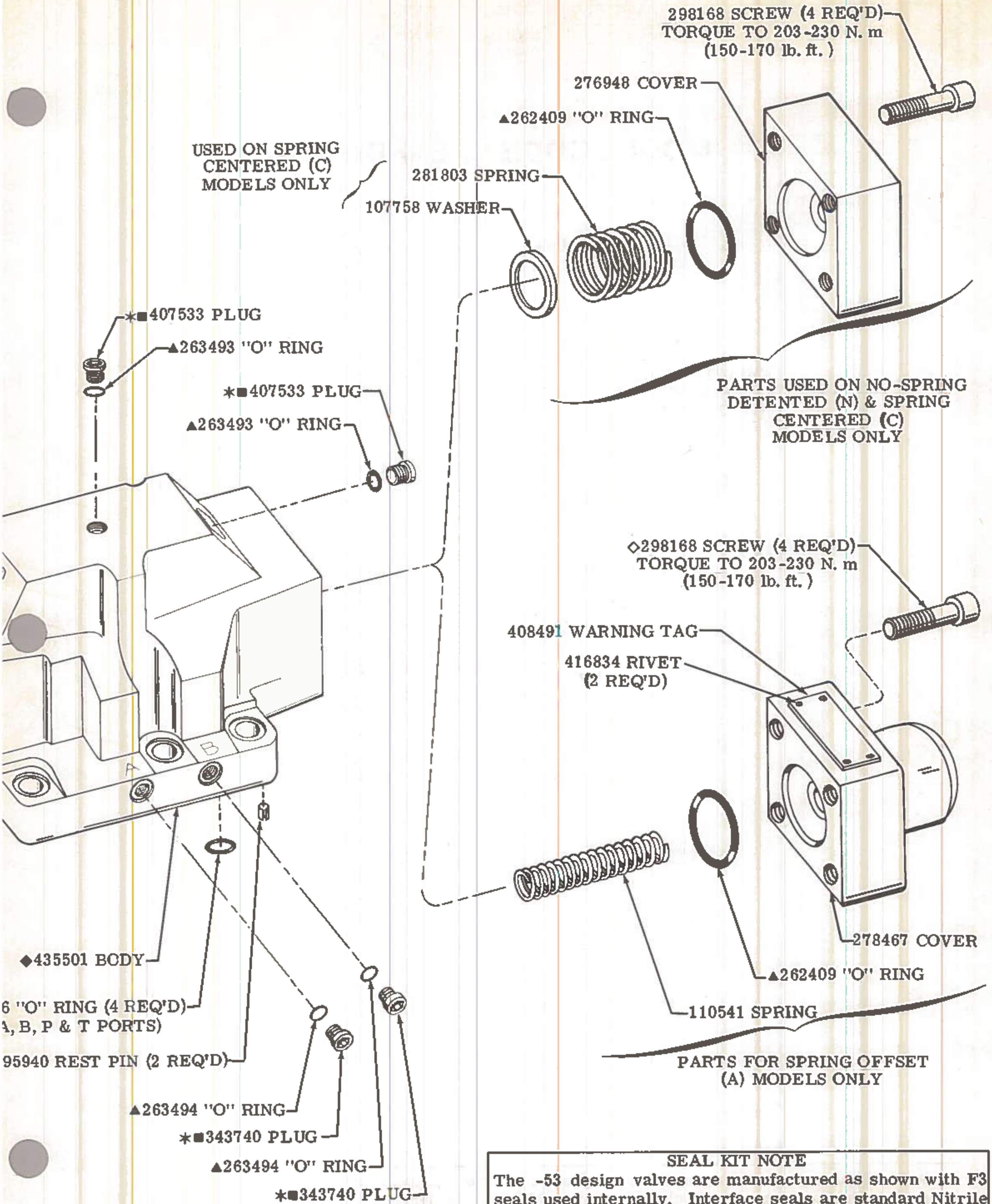


SEAL KIT NOTE

The -53 design valves are manufactured as shown with F3 seals used internally. Interface seals are standard Nitrile material and are converted to F3 in the seal kit. All seals in the seal kit are F3.

MODEL	SPOOL	ID PLATE W/ CIRCUIT DIAGRAM			
		OFFSET A		SPRING CNTR(C)	NO-SPRING DETENT(N)
		LH	RH		
DG17S4-100A/C/N	282281	434310	431539	431900	431903
DG17S4-102A/C/N	282287			431540	431541
DG17S4-104C/N	282286	———	———	431549	431905
DG17S4-106A/C/N	282283	434310	431539	431902	431906
DG17S4-108C/N	282339	———	———	431549	431905
DG17S4-1033A/C/N	282285	434310	431539	431902	431906

NOTE

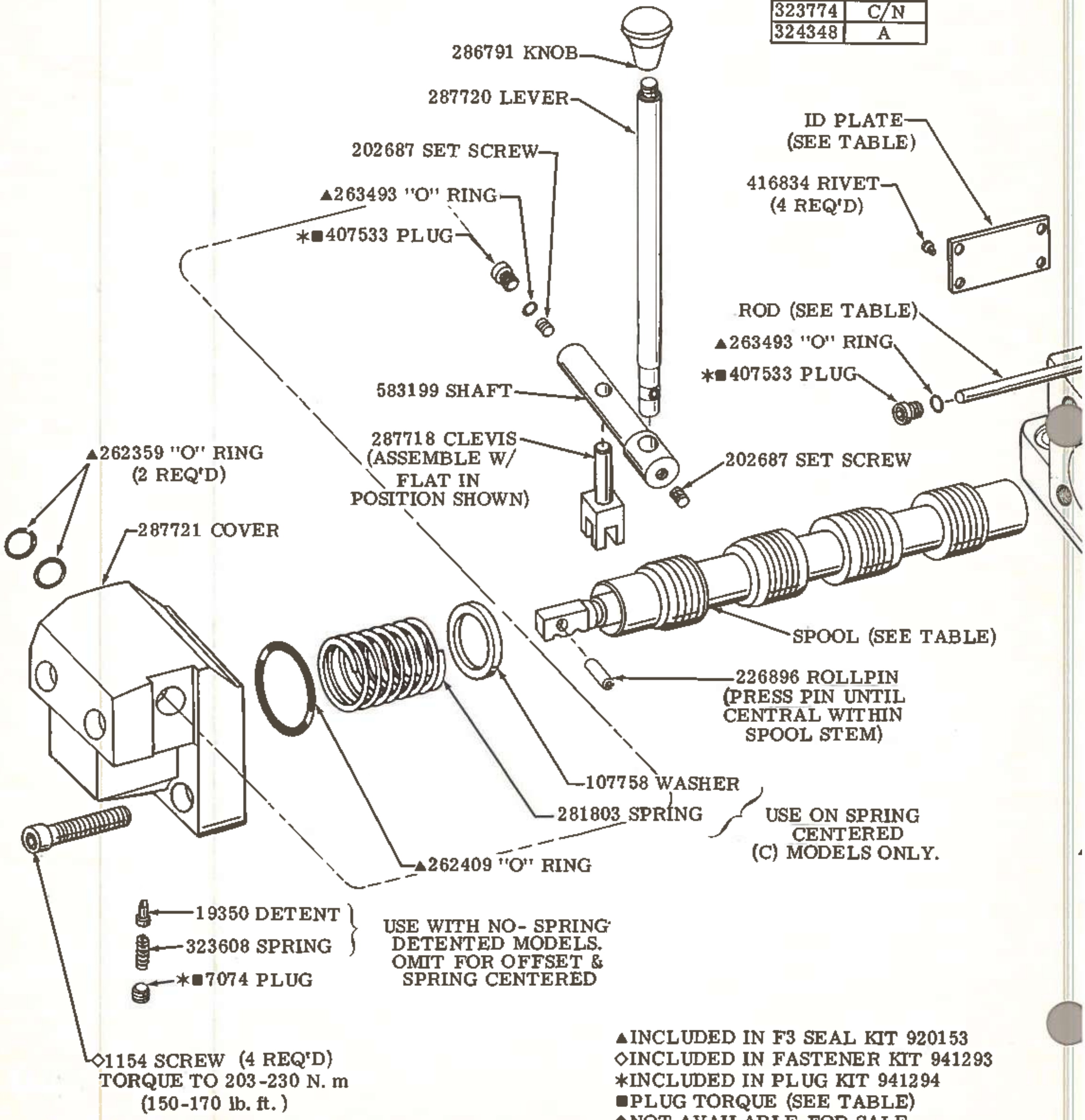
RIGHT HAND POSITION SHOWN. REVERSE END COVERS, SPOOL, & SPRING FOR LEFT HAND ASSEMBLY. CHANGE ID PLATE TO LEFT HAND (L. H.) ON SPRING OFFSET MODELS.

NOTE

PARTS INCLUDED IN SERVICE KITS NOT SOLD SEPARATELY

■PLUG TORQUE		
PLUG	N. m.	lb. in.
7074	8. 47 - 9. 6	75 - 85
343740	10. 0 - 11. 8	90 - 105
407533	3. 4 - 4. 0	30 - 35

ROD	MODEL
323774	C/N
324348	A



▲INCLUDED IN F3 SEAL KIT 920153
◇INCLUDED IN FASTENER KIT 941293
*INCLUDED IN PLUG KIT 941294
■PLUG TORQUE (SEE TABLE)
◆NOT AVAILABLE FOR SALE

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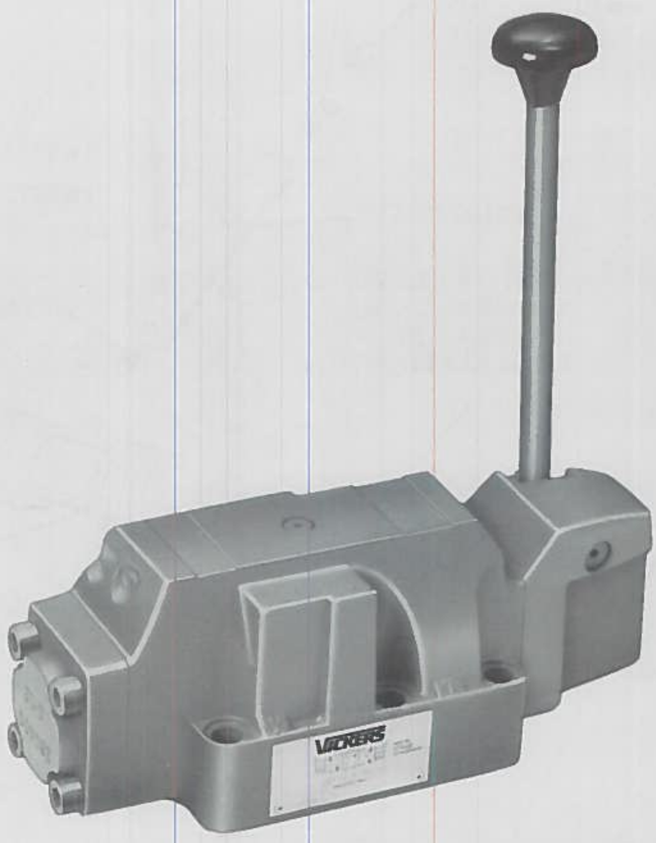
A TRINOVA COMPANY

Service Parts Information

Manual Lever Operated Directional Valve

DG17S4-10*A-53
DG17S4-10*C-53
DG17S4-10*N-53



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Revised 9-1-85

I-3564-S

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TECHNICAL INFORMATION

TROUBLE-SHOOTING GUIDE AND MAINTENANCE HINTS

INTRODUCTION

General

The trouble-shooting charts and maintenance hints that follow are of a general system nature but should provide an intuitive feeling for a specific system. The more general information is covered in the immediately following paragraphs. Effect and probable cause charts appear on the following pages.

System Design

There is, of course, little point in discussing the design of a system which has been operating satisfactorily for a period of time. However, a seemingly uncomplicated procedure such as relocating a system or changing a component part can cause problems. Because of this, the following points should be considered:

A. Each component in the system must be compatible with and form an integral part of the system. For example, an inadequate size filter on the inlet of a pump can cause cavitation and subsequent damage to the pump.
B. All lines must be of proper size and free of restrictive bends. An undersized or restricted line results in a pressure drop in the line itself.
C. Some components must be mounted in a specific position with respect to other components or the lines. The housing of an in-line pump, for example, must remain filled with fluid to provide lubrication.
D. The inclusion of adequate test points for pressure readings, although not essential for operation, will expedite trouble-shooting.

Knowing the System

Probably the greatest aid to trouble-shooting is the confidence of knowing the system. The construction and operating characteristics of each one should be understood. For example, knowing that a solenoid controlled directional valve can be manually actuated will save considerable time in isolating a defective solenoid. Some additional practices which will increase your ability and also the useful life of the system follow:

A. Know the capabilities of the system. Each component in the system has a maximum rated speed, torque, or pressure. Loading the system beyond the specifications simply increases the possibility of failure.
B. Know the correct operating pressures. Always set and check pressures with a gauge. How else can you know if the operating pressure is above the maximum rating of the components? The question may arise as to what the correct operating pressure is. If it isn't correctly specified on the hydraulic schematic, the following rule should be applied:

   The correct operating pressure is the lowest pressure which will allow adequate performance of the system function and still remain below the maximum rating of the components and machine.

   Once the correct pressures have been established, note them on the hydraulic schematic for future reference.
C. Know the proper signal levels, feedback levels, and dither and gain settings in servo control systems. If they aren't specified, check them when the system is functioning correctly and mark them on the schematic for future reference.

Developing Systematic Procedures

Analyze the system and develop a logical sequence for setting valves, mechanical stops, interlocks, and electrical controls. Tracing of flow paths can often be accomplished by listening for flow in the lines or feeling them for warmth. Develop a cause and effect troubleshooting guide similar to the charts appearing on the following pages. The initial time spent on such a project could save hours of system down-time.

Recognizing Trouble Indications

The ability to recognize trouble indications in a specific system is usually acquired with experience. However, a few general trouble indications can be discussed.

A. Excessive heat means trouble. A mis-aligned coupling places an excessive load on bearings and can be readily identified by the heat generated. A warmer than normal tank return line on a relief valve indicates operation at relief valve setting. Hydraulic fluids which have a low viscosity will increase the internal leakage of components resulting in a heat rise. Cavitation and slippage in a pump will also generate heat.
B. Excessive noise means wear, mis-alignment, cavitation or air in the fluid. Contaminated fluid can cause a relief valve to stick and chatter. These noises may be the result of dirty filters, or fluid, high fluid viscosity, excessive drive speed, low reservoir level, loose intake lines, or worn couplings.

Maintenance

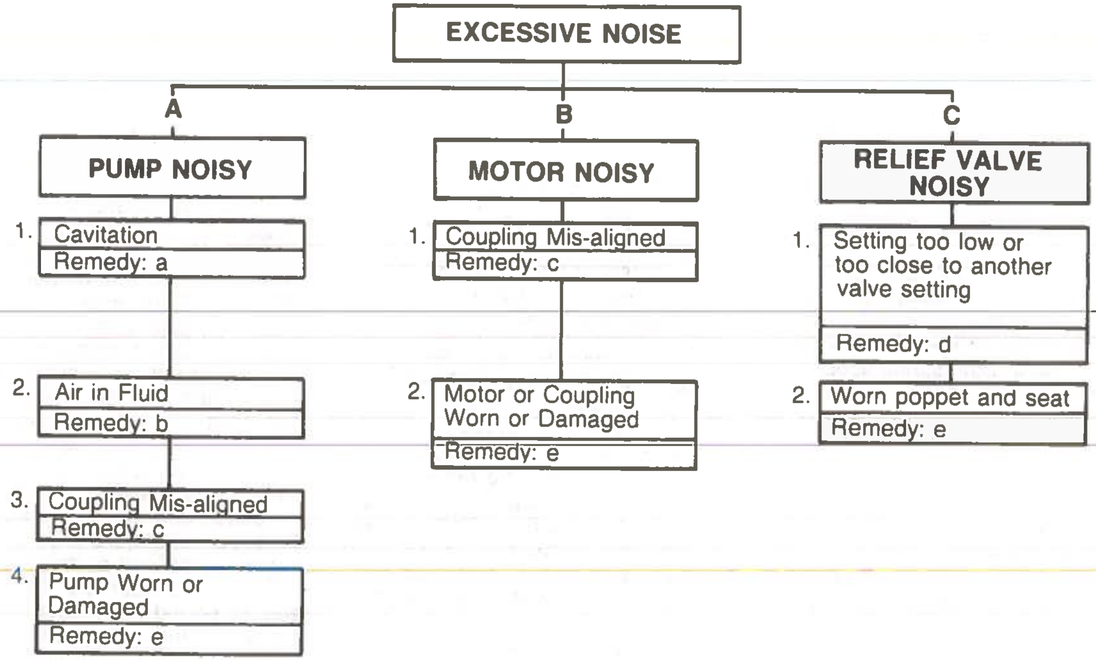
Three simple maintenance procedures have the greatest effect on hydraulic system performance, efficiency, and life. Yet, the very simplicity of them may be the reason they are so often overlooked. What are they? Simply these:

A. Maintaining a clean sufficient quantity of hydraulic fluid of the proper type and viscosity.
B. Changing filters and cleaning strainers.
C. Keeping all connections tight, but not to the point of distortion, so that air is excluded from the system.

TROUBLE-SHOOTING GUIDES

The following charts are arranged in five main categories. The heading of each one is an effect which indicates a malfunction in the system. For example; if a pump is exceptionally noisy, refer to Chart I titled EXCESSIVE NOISE. The noisy pump appears in Column A under the main heading. In Column A there are four probable causes for a noisy pump. The causes are sequenced according to the likelihood of happening or the ease of checking it. The first cause is cavitation and the remedy is "a". If the first cause does not exist, check for cause number 2, etc.

CHART 1



REMEDIES:

a. Any or all of the following: Replace dirty filters - Wash strainers in solvent compatible with system fluid - Clean clogged inlet line - Clean or replace reservoir breather vent - Change system fluid - Change to proper pump drive motor speed - Overhaul or replace supercharge pump - Fluid may be too cold.
b. Any or all of the following: Tighten leaking connections - Fill reservoir to proper level (with rare exception all return lines should be below fluid level in reservoir) - Bleed air from system - Replace pump shaft seal (and shaft if worn at seal journal).
c. Align unit and check condition of seals, bearings and coupling.
d. Install pressure gauge and adjust to correct pressure.
e. Overhaul or replace.

CHART 4

INCORRECT PRESSURE

A. NO PRESSURE

1. No flow
   Remedy: See Chart 3 column A

B. LOW PRESSURE

1. Pressure relief path exists
   Remedy: See Chart 3, column A and B
2. Pressure reducing valve set too low
   Remedy: d
3. Pressure reducing valve damaged
   Remedy: e
4. Damaged pump, motor or cylinder
   Remedy: e

C. ERRATIC PRESSURE

1. Air in fluid
   Remedy: b
2. Worn relief valve
   Remedy: e
3. Contamination in fluid
   Remedy: a
4. Accumulator defective or has lost charge
   Remedy: c
5. Worn pump, motor or cylinder
   Remedy: e

D. EXCESSIVE PRESSURE

1. Pressure reducing, relief or unloading valve misadjusted
   Remedy: d
2. Yoke actuating device inoperative (variable displacement pumps)
   Remedy: e
3. Pressure reducing, relief or unloading valve worn or damaged
   Remedy: e

REMEDIES:

a. Replace dirty filters and system fluid.
b. Tighten leaking connections (fill reservoir to proper level and bleed air from system).
c. Check gas valve for leakage - Charge to correct pressure - Overhaul if defective.
d. Adjust.
e. Overhaul or replace.

CHART 3

INCORRECT FLOW

A. NO FLOW

1. Pump not receiving fluid — Remedy: a
2. Pump drive motor not operating — Remedy: e
3. Pump to drive coupling sheared — Remedy: c
4. Pump drive motor turning in wrong direction — Remedy: g
5. Directional control set in wrong position — Remedy: f
6. Entire flow passing over relief valve — Remedy: d
7. Damaged pump — Remedy: c
8. Improperly assembled pump — Remedy: e

B. LOW FLOW

1. Flow control set too low — Remedy: d
2. Relief or unloading valve set too low — Remedy: d
3. Flow by-passing thru partially open valve — Remedy: e or f
4. External leak in system — Remedy: b
5. Yoke actuating device inoperative (variable displacement pumps) — Remedy: e
6. RPM of pump drive motor incorrect — Remedy: h
7. Worn pump, valve, motor, cylinder, or other component — Remedy: e

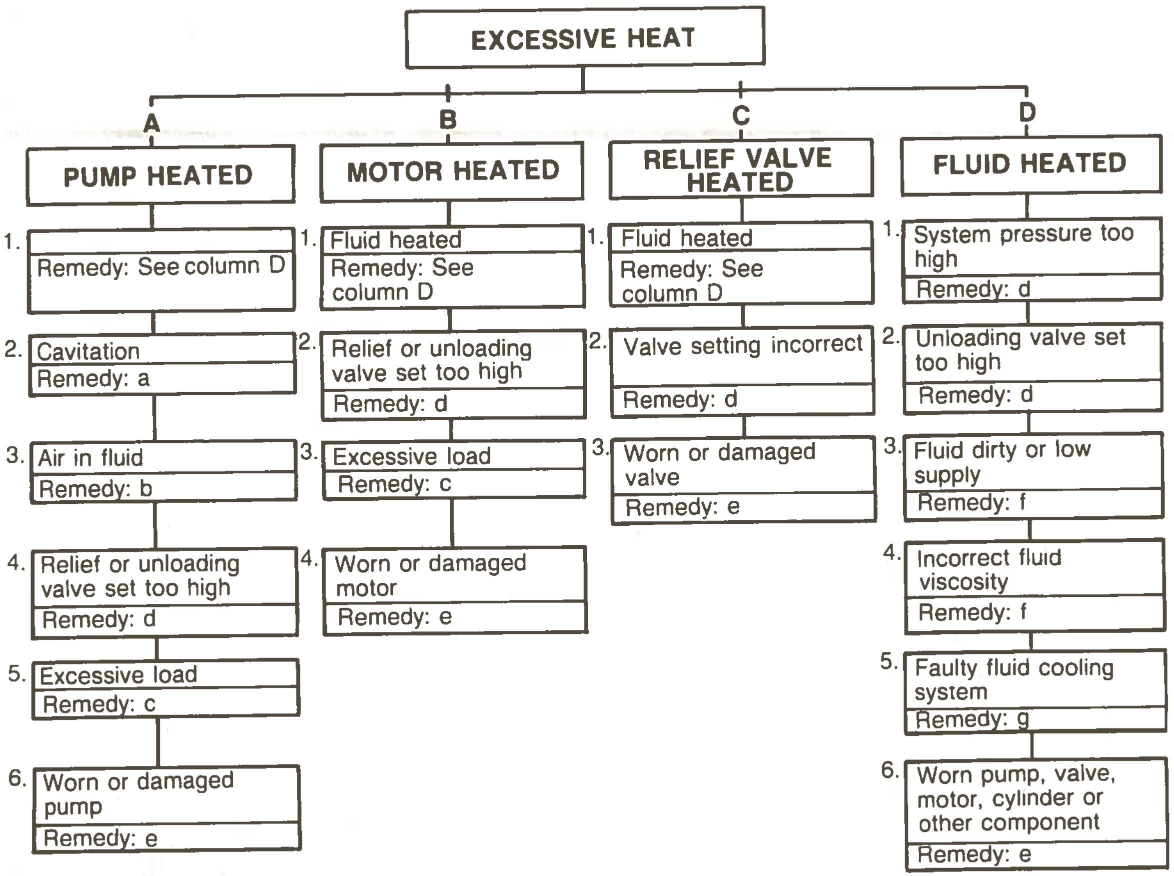
C. EXCESSIVE FLOW

1. Flow control set too high — Remedy: d
2. Yoke actuating device inoperative (variable displacement pumps) — Remedy: e
3. RPM of pump drive motor incorrect — Remedy: h
4. Improper size pump used for replacement — Remedy: h

REMEDIES:

a. Any or all of the following: Replace dirty filters - Clean clogged inlet line - Clean or replace reservoir breather vent - Fill reservoir to proper level -Overhaul or replace supercharge pump.
b. Tighten leaking connections.
c. Check for damaged pump or pump drive - replace and align coupling.
d. Adjust.
e. Overhaul or replace.
f. Check position of manually operated controls - Check electrical circuit on solenoid operated controls - Repair or replace pilot pressure pump.
g. Reverse rotation.
h. Replace with correct unit.

CHART 2



REMEDIES:

a. Any or all of the following: Replace dirty filters - Clean clogged inlet line - Clean or replace reservoir breather vent - Change system fluid - Change to proper pump drive motor speed - Overhaul or replace supercharge pump.
b. Any or all of the following: Tighten leaking connections - Fill reservoir to proper level (with rare exception all return lines should be below fluid level in reservoir) - Bleed air from system - Replace pump shaft seal (and shaft if worn at seal journal).
c. Align unit and check condition of seals and bearings - Locate and correct mechanical binding - Check for work load in excess of circuit design.
d. Install pressure gauge and adjust to correct pressure (Keep at least 125 PSI difference between valve settings).
e. Overhaul or replace.
f. Change filters and also system fluid if of improper viscosity - Fill reservoir to proper level.
g. Clean cooler and/or cooler strainer - Replace cooler control valve - Repair or replace cooler.

CHART 5

FAULTY OPERATION

A — NO MOVEMENT	B — SLOW MOVEMENT	C — ERRATIC MOVEMENT	D — EXCESSIVE SPEED OR MOVEMENT
1. No flow or pressure Remedy: See Chart III	1. Low flow Remedy: See Chart 3	1. Erratic pressure Remedy: See Chart IV	1. Excessive flow Remedy: See Chart 3
2. Limit or sequence device (mechanical, electrical, or hydraulic) inoperative or misadjusted Remedy: e	2. Fluid viscosity too high Remedy: a	2. Air in fluid Remedy: See Chart I	2. Feedback transducer malfunctioning Remedy: e
3. Mechanical bind Remedy: b	3. Insufficient control pressure for valves Remedy: See Chart 4	3. No lubrication of machine ways or linkage Remedy: g	3. Misadjusted or malfunctioning servo amplifier Remedy: c
4. No command signal to servo amplifier Remedy: f	4. No lubrication of machine ways or linkage Remedy: g	4. Erratic command signal Remedy: f	4. Over-riding work load Remedy: h
5. Inoperative or misadjusted servo amplifier Remedy: c	5. Misadjusted or malfunctioning servo amplifier Remedy: c	5. Misadjusted or malfunctioning servo amplifier Remedy: c	
6. Inoperative servo valve Remedy: e	6. Sticking servo valve Remedy: d	6. Malfunctioning feedback transducer Remedy: e	
7. Worn or damaged cylinder or motor Remedy: e	7. Worn or damaged cylinder or motor Remedy: e	7. Sticking servo valve Remedy: d	
		8. Worn or damaged cylinder or motor Remedy: e	

REMEDIES:

a. Fluid may be too cold or should be changed to clean fluid of correct viscosity.
b. Locate bind and repair.
c. Adjust, repair, or replace.
d. Clean and adjust or replace - Check condition of system fluid and filters.
e. Overhaul or replace.
f. Repair command console or interconnecting wires.
g. Lubricate.
h. Adjust, repair, or replace counterbalance valve.

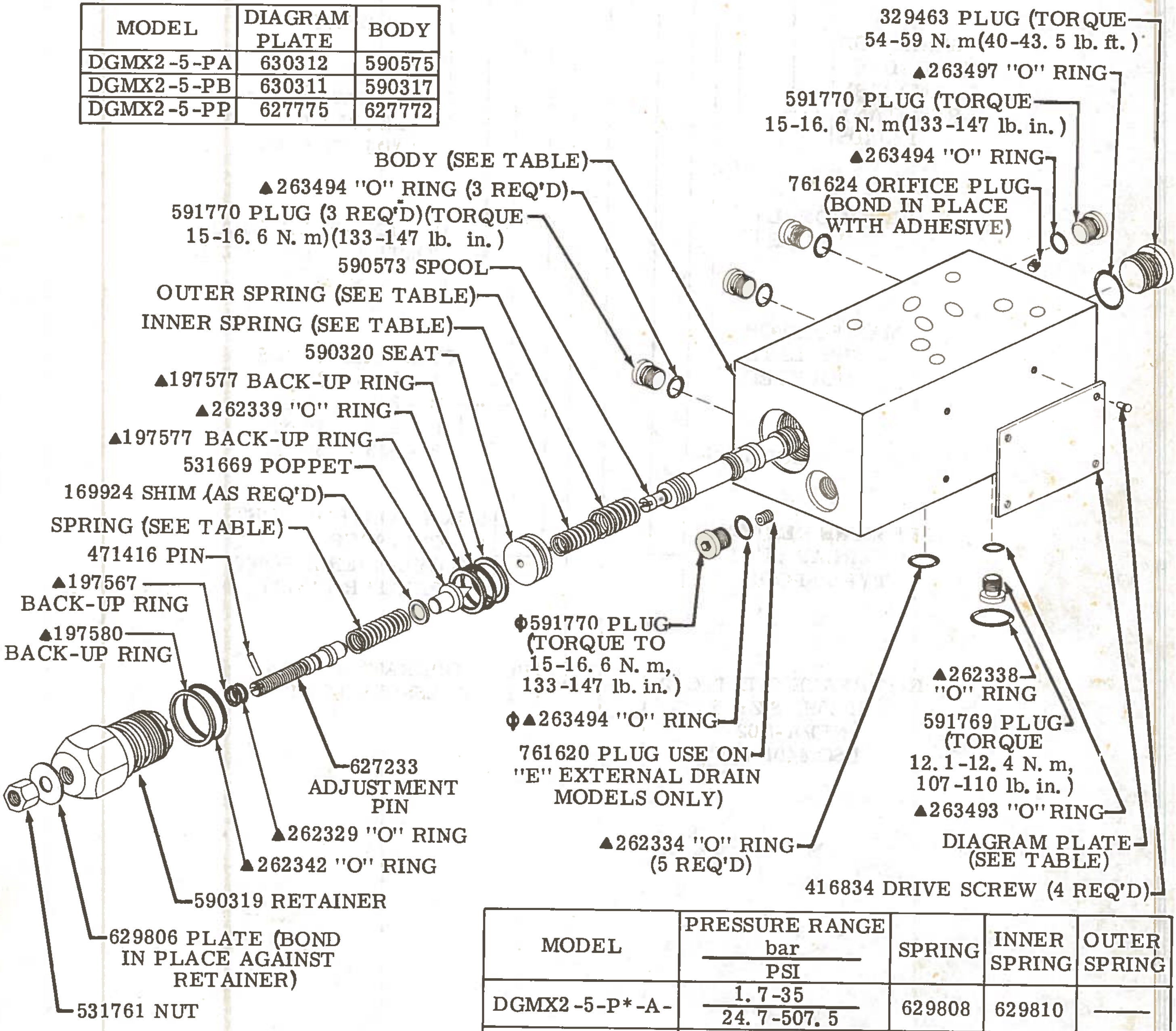
Service Parts Information

VICKERS
A TRINOVA COMPANY

PRESSURE REDUCING MODULE

DGMX2-5-P*-*-*-W-20

MODEL	DIAGRAM PLATE	BODY
DGMX2-5-PA	630312	590575
DGMX2-5-PB	630311	590317
DGMX2-5-PP	627775	627772



ϕOMIT ON "E" EXTERNAL DRAIN MODELS

▲INCLUDED IN F3 SEAL KIT 920269

MODEL	PRESSURE RANGE bar / PSI	SPRING	INNER SPRING	OUTER SPRING
DGMX2-5-P*-A-	1. 7-35 / 24. 7-507. 5	629808	629810	——
DGMX2-5-P*-B-	8. 5-140 / 123. 3-1015	590321	595526	590322
DGMX2-5-P*-C-	8. 5-140 / 123. 3-2030	590574	595526	590322
DGMX2-5-P*-F-	8. 5-250 / 123. 3-3625	595527	595526	590322

MODEL CODE BREAKDOWN

(F3)-DGMX2-5-P*-*-*-W-20

- (F3) — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- D — DIRECTIONAL VALVE
- G — MANIFOLD OR SUBPLATE MOUNTED
- M — MODULE
- X — PRESSURE REDUCING OVERLAP VENT TYPE SPOOL
- 2 — INTERFACE C.E.T.O.P. RP35H, SIZE 5 NFPA-D02 (ISO 4401-05)
- 5 — PORT OPERATED UPON
  P - PRESSURE PORT
- P* — PILOT CONTROL PORT
  A - CYLINDER A PORT
  B - CYLINDER B PORT
  P - PRESSURE PORT
- * — PRESSURE RANGE
  A - 1.7 - 35 bar
  B - 8.5 - 70 bar
  C - 8.5 - 140 bar
  F - 8.5 - 250 bar
- * — E - EXTERNAL DRAIN (OMIT FOR INTERNAL DRAIN)
- W — SCREW AND LOCKNUT ADJUSTMENT
- 20 — DESIGN

To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

Litho in U.S.A.

Service Parts Information

VICKERS®
A TRINOVA COMPANY

INSTA-PLUG CONNECTOR

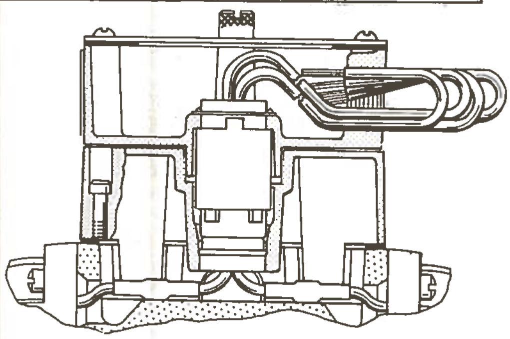
DG4S*-01**-5*

THE INSTA-PLUG FEATURE CAN BE ADDED TO ANY DG4S*-01**-5* DIRECTIONAL VALVE. INSTA-PLUG FEATURE VALVES ARE ASSIGNED A PA OR PB PREFIX TO THE MODEL CODE. PA INDICATES THE PLUG IS INCLUDED AND PB INDICATES THAT BOTH THE PLUG AND RECEPTACLE ARE INCLUDED. EXAMPLE: PADG4S4-012-5* OR PBDG4S4-012-5*. INSTA-PLUG CONVERSION KITS ONLY ARE SHOWN ON THIS DRAWING. REFER TO THE BASIC VALVE PARTS DRAWING FOR OTHER INFORMATION.

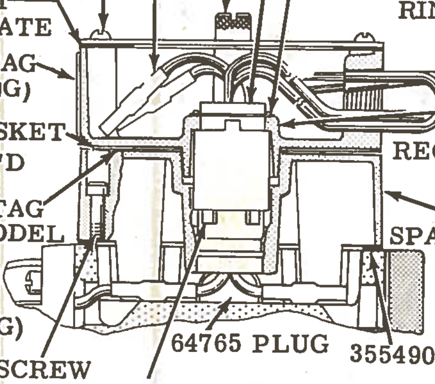
WIRING NOTE:
CONNECT WHITE WIRES TO "A" SOLENOID AND BLACK WIRES TO "B" SOLENOID.

NOTE:
ALL VIEWS SHOWN ARE FROM DIAGRAM PLATE SIDE OF VALVE.

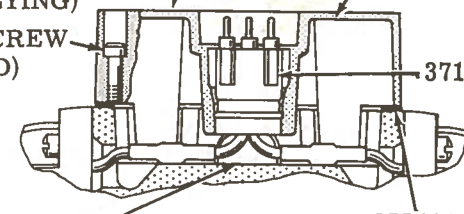
WIRING CONNECTIONS FOR DOUBLE SOLENOID MODELS



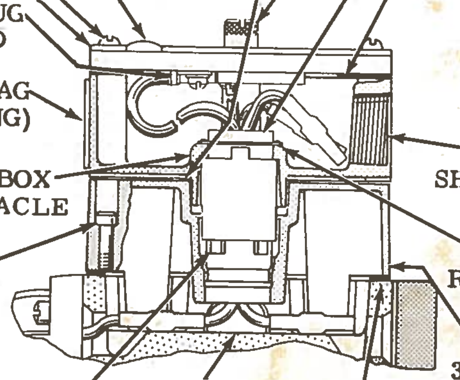
WIRING CONNECTIONS FOR SINGLE SOLENOID MODELS



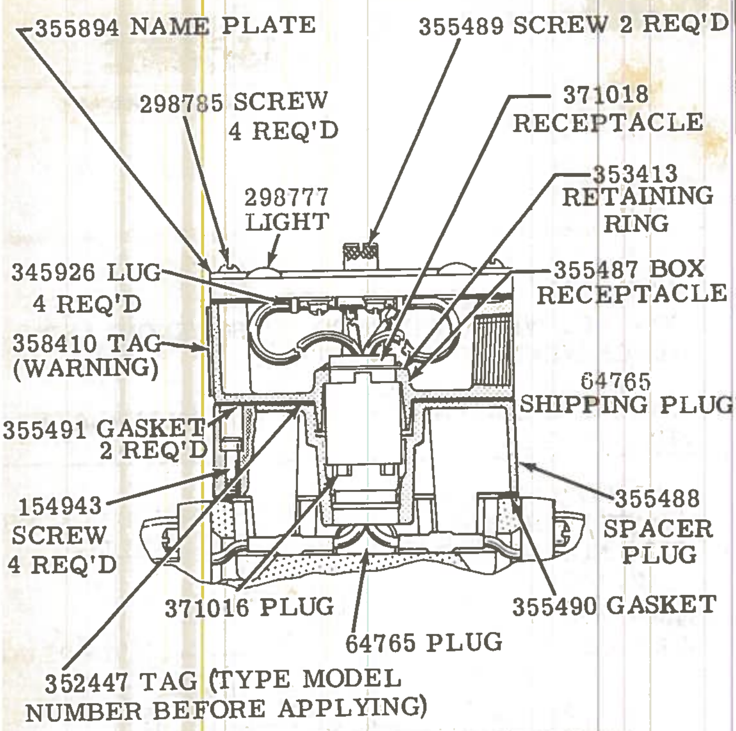
PLUG & RECEPTACLE KIT 942064



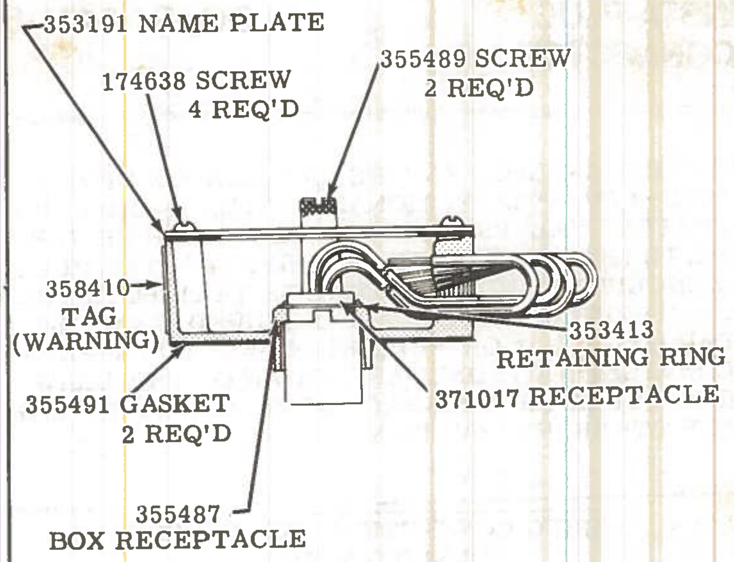
PLUG KIT 942063



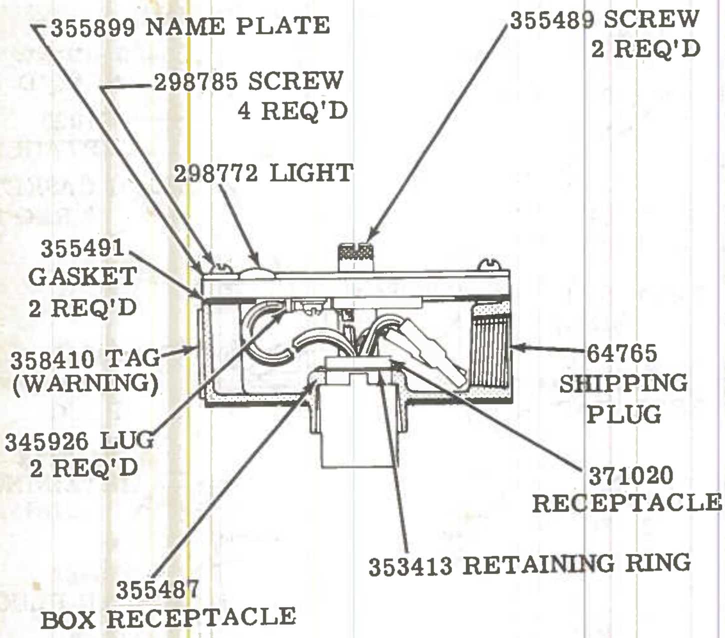
PLUG & RECEPTACLE WITH SINGLE INDICATOR LIGHT IS NO LONGER AVAILABLE AS A KIT.



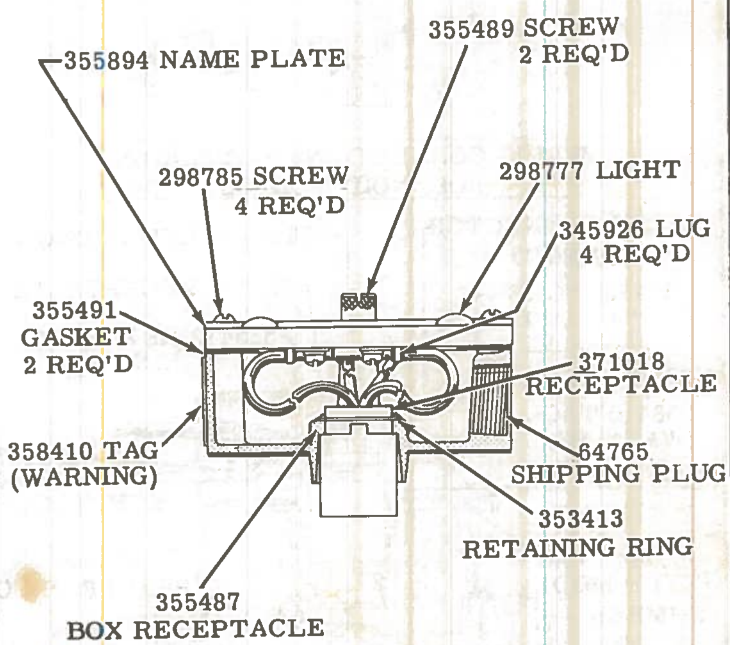
PLUG & RECEPTACLE WITH DOUBLE INDICATOR LIGHT KIT
942066 (100 thru 127 V. A. C.)
941182 (192 thru 233 V. A. C.)



RECEPTACLE KIT 942067



RECEPTACLE WITH SINGLE INDICATOR LIGHT IS NO LONGER AVAILABLE AS A KIT.



RECEPTACLE WITH DOUBLE INDICATOR LIGHT KIT
942069 (100 thru 127 V. A. C.)
941183 (192 thru 233 V. A. C.)

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

HYDRAULIC REMOTE PRESSURE COMPENSATOR

PVB-5/6-**-CG-10/-20
PVB-10/15-**-CG-10/-20
PVB-20/29-**-CG-10/-20
PVB-45A-CAG-10/-20

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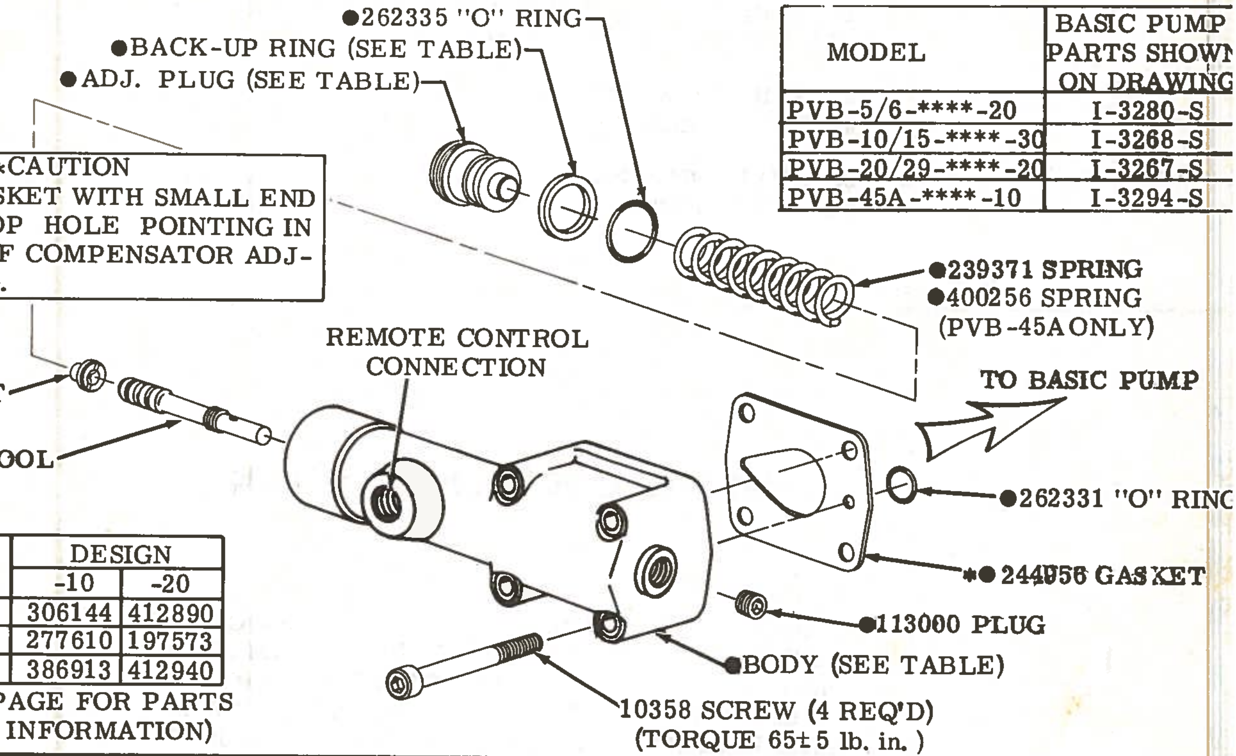
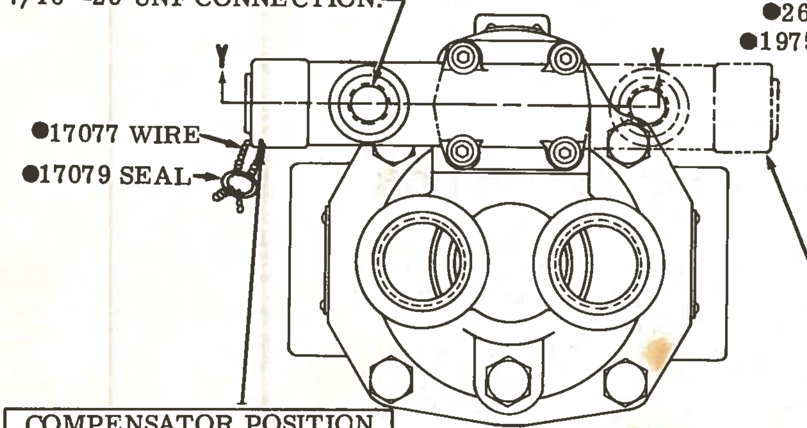
MODEL	BASIC PUMP PARTS SHOWN ON DRAWING
PVB-5/6-****-20	I-3280-S
PVB-10/15-****-30	I-3268-S
PVB-20/29-****-20	I-3267-S
PVB-45A-****-10	I-3294-S

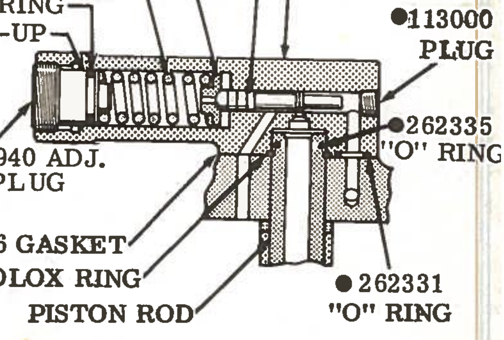
*CAUTION
POSITION GASKET WITH SMALL END OF TEARDROP HOLE POINTING IN DIRECTION OF COMPENSATOR ADJUSTING PLUG.



PART NAME	DESIGN -10	DESIGN -20
BODY	306144	412890
B/U RING	277610	197573
ADJ.PLUG	386913	412940

(SEE BACK PAGE FOR PARTS ORDERING INFORMATION)





SECTION Y-Y

COMPENSATOR POSITION FOR -20 DESIGN MODELS
PVB-5/6 LEFT HAND (CCW) SHAFT ROTATION
PVB-10/15 RIGHT HAND (CW) SHAFT ROTATION
PVB-20/29/45A R.H. & L.H.

●INCLUDED IN -20 DESIGN COMPENSATOR KITS	
PVB-5/6, 10/15, 20/29	942480
PVB-45A	942444

COMPENSATOR POSITION FOR -20 DESIGN MODELS
PVB5/6 RIGHT HAND (CW) SHAFT ROTATION. AVAILABLE ONLY WITH ADJ. MAXIMUM STOP FEATURE. (CCG).
PVB10/15 LEFT HAND (CCW) SHAFT ROTATION. (SHOWN).

COMPENSATOR ADJUSTMENT PROCEDURE

1. TURN REMOTE PRESSURE CONTROL (SUCH AS C-175) TO MINIMUM SETTING.
2. TURN COMPENSATOR ADJUSTMENT PLUG TO MINIMUM PRESSURE (250 PSI OR HIGHER).
3. FULL PRESSURE RANGE CAN NOW BE OBTAINED WITH THE REMOTE PRESSURE CONTROL.

MODEL CODE BREAKDOWN

REFER TO PARTS DRAWINGS TABULATED ON THE FRONT PAGE FOR MODEL CODE INFORMATION. ALL MODEL CODE DATA PERTAINS EXCEPT FOR THE CONTROL. C(*) IS REPLACED BY "CG" WHEN THE REMOTE CONTROL COMPENSATOR IS USED.

PARTS ORDERING INFOMATION

THE -10 AND -20 DESIGNS ARE SHOWN ON THIS DRAWING FOR COMPARISON PURPOSES. WHEN ORDERING REPLACEMENT PARTS FOR THE CG COMPENSATOR, NOTE THE -10 DESIGN PARTS ARE SUPERSEDED BY THE -20 DESIGN PARTS LISTED IN THE TABLE. ALL OTHER PARTS ARE COMMON TO THE -10 AND -20 DESIGN.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 16/13 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

Service Parts Information

VICKERS®
A TRINOVA COMPANY

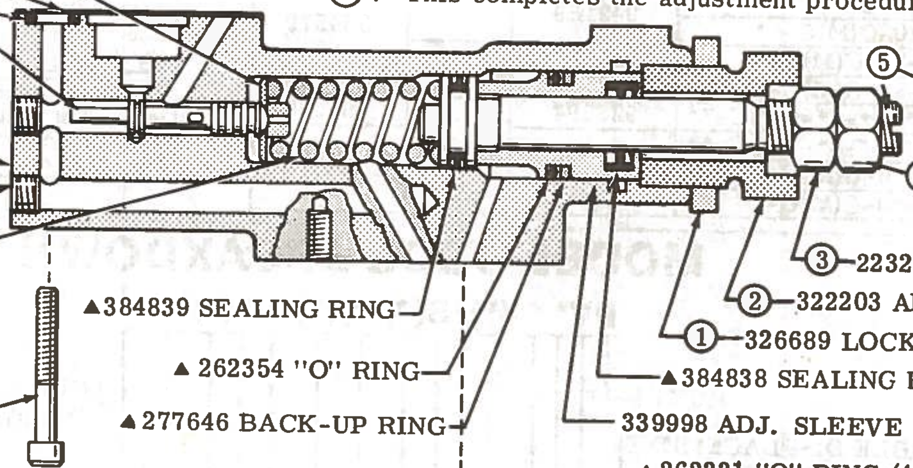
DUAL RANGE & ADJ. MAX. STOP COMPENSATOR

PVB/E*-(F)*S(F)(*)(Y)-*-C(M)D-20
PVB*-(F)*S(F)(*)(Y)-*-C(M)DH-11

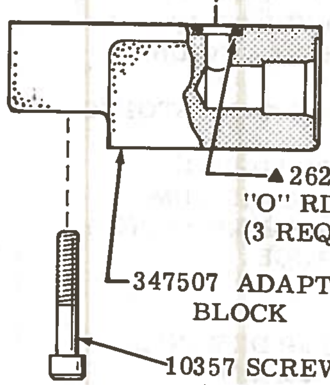
CD, CMD, CDH, CMDH, CONTROL ADJUSTMENT PROCEDURE

1. Loosen locknuts ① and ④.
2. Turn adjusting spool ⑤ until nut ③ is bottomed against adjusting plug ②. Adjusting spool threads will be full extended.
3. With the directional valve de-energized; or in the Hydraulic System having the pressure port "P" blocked and port "B" open to port "T", adjust the lowest pressure setting by turning adjusting plug ②. Tighten locknut ① after adjustment is completed.
4. Energize the directional valve; or in the Hydraulic System, have pressure port "P" open to port "A".
5. Turn adjusting spool ⑤ to the highest pressure adjustment. Tighten locknut ④. This completes the adjustment procedure.

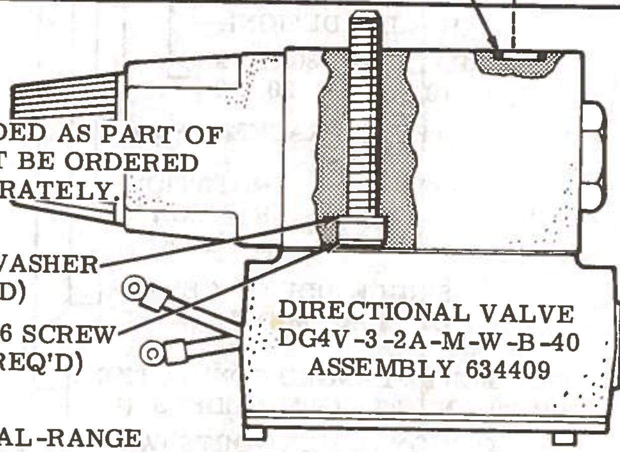
*CAUTION
Position gasket with small end of teardrop hole pointing in direction of compensator adjusting plug.



SPRING	MODEL
239371	PVB/E*-CD
	PVB*-CDH
265693	PVB*-CMD
	PVB*-CMDH



HYDRAULIC, DUAL-RANGE PRESSURE COMPENSATOR CONTROL, (CDH or CMDH)



ELECTRIC, DUAL-RANGE PRESSURE COMPENSATOR CONTROL, (CD or CMD)

▲ INCLUDED IN 919621 F3 SEAL KIT

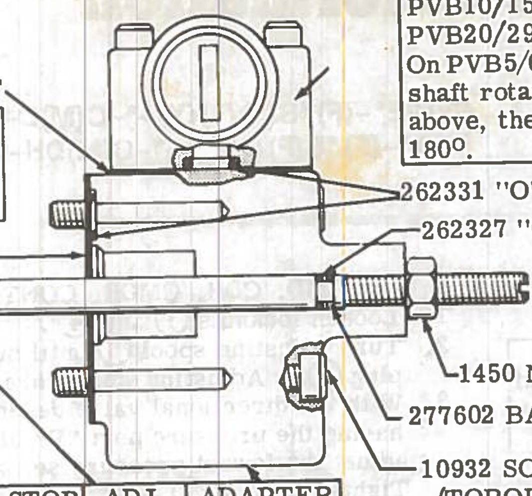
COMPENSATOR S/A KITS INCLUDE ALL PARTS SHOWN EXCEPT DIRECTIONAL VALVE

COMPENSATOR S/A KIT	
CMD-941033	CMDH-942114
CD-941032	CDH-942115

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

PVB*-(F)*S(F)(*)(Y)-*-C(M)C-*
PVE19*-Q**-*-3*-C**-10/11**

COMPENSATOR POSITION SHOWN FOR:
PVB5/6-L.H. Shaft Rotation
PVB10/15 & PVE19 R.H. Shaft Rotation
PVB20/29-R.H. or L.H. Shaft Rotation
On PVB5/6/10/15 & PVE19 models, if the shaft rotation is changed from that shown above, the compensator must be rotated 180°.



*CAUTION
Position gasket with small end of teardrop hole pointing in direction of compensator adjusting plug.

All part numbers shown included in maximum stop subassembly.

MODEL	MAX. STOP S/A NO.	ADJ. ROD	ADAPTER BLOCK
PVB5-*LS*-20-C(M)C-**	942188	354573	354578
PVB6-*LS*-20-C(M)C-**			
PVB5-*RS*-20-C(M)C-**	942189		354579
PVB6-*RS*-20-C(M)C-**			
PVB1*-*LS*-3*-C(M)C-**	942190	354574	
PVB1*-*RS*-3*-C(M)C-**	942191		354578
PVE19L-Q****-*-3*-C(*)C-**	926294		354579
PVE19R-Q****-*-3*-C(*)C-**	942192	354575	354578
PVB2*-*LS*-*0-C(M)C-**			
PVB2*-*RS*-*0-C(M)C-**			

Included in Max. Stop S/A but not shown 200087 O'Ring, 567707 and 567848 sleeve's. Sleeve 567848 (color coded red) used only on CCVP models.

To assist initial priming, manual adjustment control setting must be at least 40% of maximum flow position. Maximum flow position occurs when rod is fully extended.

MODEL CODE BREAKDOWN

PV* *-(*)*S(*)(*)(*)-*-*(*)(*)-*

- PUMP
- VARIABLE DISPLACEMENT
  - B - INLINE B SERIES
  - E - INLINE E SERIES
- IN-LINE DESIGN
- GPM RATING @1800 RPM
  - 5, 6, 10, 15, 19, 20, 29
- FOOT BRACKET (F)
- ROTATION
  - R - RIGHT
  - L - LEFT
- SINGLE SIDE OF CENTER DISPLACEMENT (S)
- SIDE PORT FLANGED CONNECTIONS ON 20 AND 29. GPM MODELS (F)
- OPTIONAL SIDE PORTS (W) (NOTE: (X) THRU SHAFT MODELS ARE NOT AVAILABLE WITH DUAL RANGE COMP. AND MAX. STOP FEATURES ON PVB 20/29 UNITS.)
- STANDARD SHAFT
  - PVB SERIES (Y)
  - PVE SERIES (1)
- CURRENT PUMP DESIGN
  - -20 (5, 6, 20, 29)
  - -30 (10, 15, 19)
- COMPENSATOR SPRING REFER TO SPECIFIC PUMP DRAWING FOR COMPENSATOR PRESSURE RANGE
- ADJUSTABLE MAX. STOP (C)
- DUAL ELECTRIC COMPENSATOR (D)
- DUAL HYDRAULIC COMPENSATOR (DH)
- CURRENT CONTROL DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 16/13 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

Litho in U.S.A.

Service Parts Information

VICKERS®
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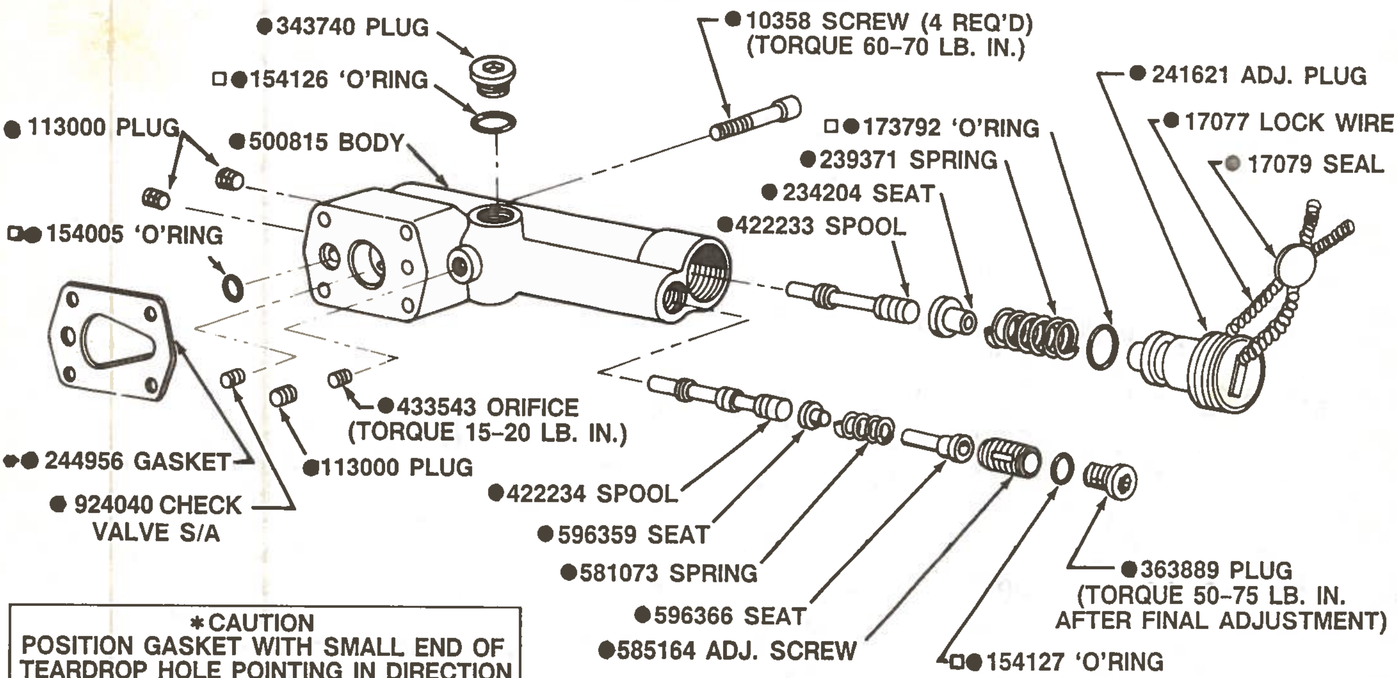
PRESSURE LIMITING LOAD SENSING COMPENSATOR

PVB-5 Thru 29-CVP-12

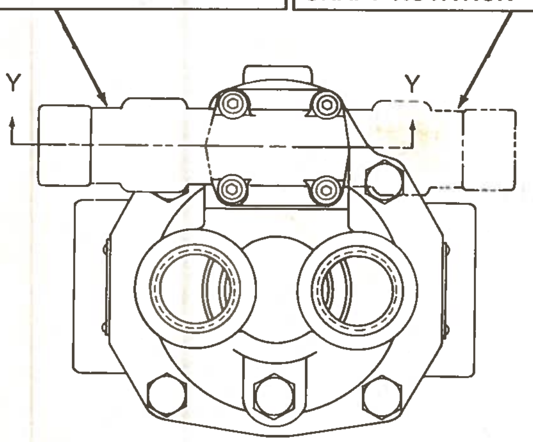


*CAUTION
POSITION GASKET WITH SMALL END OF TEARDROP HOLE POINTING IN DIRECTION OF COMPENSATOR ADJUSTING PLUGS.

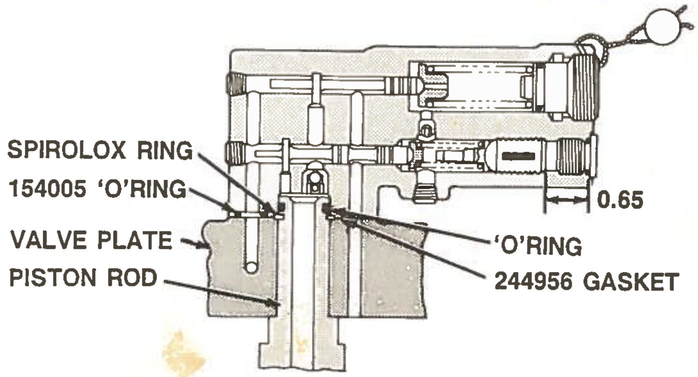
● INCLUDED IN CVP-12 COMPENSATOR KIT 924069

□NOTE
REPLACEMENT SEALS FOR THE CVP COMPENSATOR ARE INCLUDED IN BASIC PUMP SEAL KIT.

CVP COMPENSATOR MOUNT FOR PVB-10/15/20/29 PUMP WITH R.H. SHAFT ROTATION OR PVB-5/6 PUMP WITH L.H. SHAFT ROTATION	CVP COMPENSATOR MOUNT FOR PVB-10/15/20/29 PUMP WITH L.H. SHAFT ROTATION OR PVB-5/6 PUMP WITH R.H. SHAFT ROTATION



MODEL	BASIC PUMP PARTS DRAWING
PVB-5/6	I-3280-S, I-3261-S
PVB-10/15	I-3268-S, I-3282-S
PVB-20/29	I-3267-S, I-3293-S



SECTION Y-Y

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

CVP-12 Compensator Adjustment Procedure

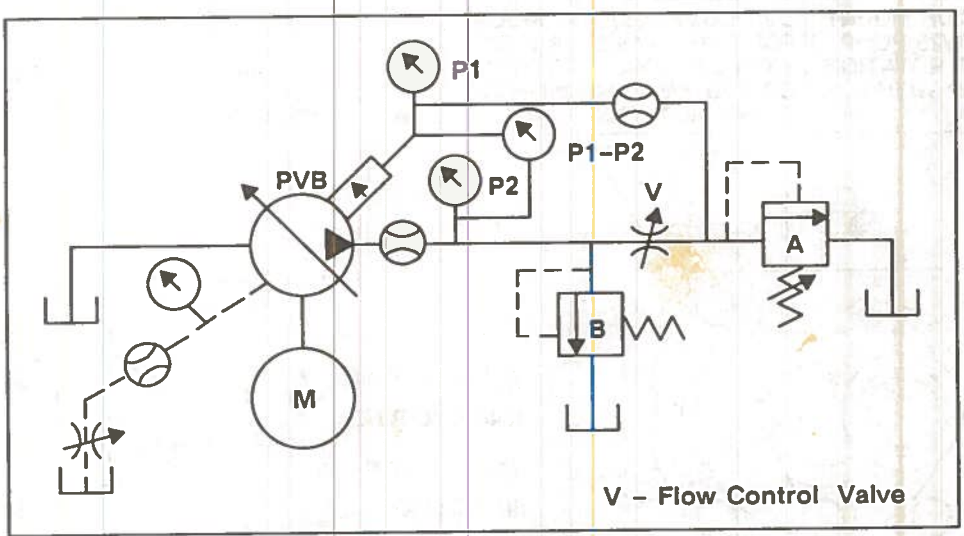
Refer to front page and test circuit diagram. Perform the following steps:

1. Turn pressure limiting adjusting plug 241621 clockwise until seated. Turn in load sensing adjusting screw 585164 to approximately 0.65 inch. See sectional view Y-Y.
2. Operate the pump at the shaft speed (rpm) indicated in the Table 1 below. Warm up system fluid to 110–130° F. Maintain 0-5 psi at pump inlet.
3. Adjust valve 'A' to obtain 104 bar (1500 psi) at 'P2'.
4. Adjust valve 'B' to obtain a pump flow set point that is specified in Table 1.

MODEL	RPM	PUMP FLOW SET POINT	Δ P DIFF. @ 95% FLOW
PVB5	2400	4 gpm	+5 / −15
PVB6	2400	4 gpm	+5 / −15
PVB10	2400	6 gpm	+5 / −15
PVB15	2400	10 gpm	+5 / −15
PVB20	2000	12 gpm	+5 / −15
PVB29	2000	15 gpm	+5 / −15

Table 1.

5. Turn load sensing adjustment screw 585164 until 8.8–10.2 bar (140–180 psi) pressure differential is obtained between 'P1' and 'P2'.
6. Vary the pump outlet flow from 1.5 gpm to the pump flow set point with valve 'B'. A differential pressure reading should be within the value shown in Table 1. Differential pressure is defined as the pressure between the compensator cracking pressure (pressure at which the outlet flow equals 95% of full flow) and the pressure at the pump flow set point.
7. Turn pressure limiter adjustment plug 241621 counterclockwise until approximately .60 inch of threads are exposed. Close valve 'A'. Minimum pressure at 'P2' must not exceed 250 psi for PVB5/6/20/29 units, or 350 psi for PVB10/20 units.
8. Turn the pressure limiter plug clockwise to retract the yoke to flow cutoff position (minimum stroke). Pressure at 'P2' must not exceed 2000 psi for PVB6/15/29 units, or 3000 psi for PVB5/10/20 units.
9. Shut down the system after compensator adjustments are completed. Install 154127 'o'ring on 363889 plug. Install the plug into end of compensator body and tighten to 50–75 lb. in.
10. Use a .089 drill bit and drill a hole through the compensator body and pressure limiter adjustment plug as shown in sectional view Y-Y.
11. Install lock wire into hole. Twist the wire and install the seal on the lock wire. Squeeze the seal to the lock wire with a suitable tool.



Test Circuit Diagram

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 16/13 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

Litho in U.S.A.

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Service Parts Information

Dual Feed Control Panels

CPGD-06-*A-12
CPGD-06-*AA-12

Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 12-1-84 **I-3609-S**

CONVERSION OF A SINGLE FEED PANEL TO A DUAL FEED PANEL IS ACCOMPLISHED BY INSTALLING CONVERSION KIT 942250. THE KIT CONTAINS THE FOLLOWING PARTS:		
PART NO.	NAME	QTY.
155091	BACK-UP RING	1
177537	SPRING	1
200978	SPRING	1
207638	PLUG	1
207772	SHAFT	1
207775	INDICATOR	1
207782	SET SCREW	1
224347	ROD	1
224352	THROTTLE (COARSE)	1
262330	"O" RING	1
349143	DIAL S/A	1
349458	PAWL	1
375643	COVER PLATE	1

WITH 207772 SHAFT TURNED IN, ADJUST 207638 POSITIONING PLUG IN DIAL SO THAT "O" ON DIAL LINES UP WITH POINTER ON COVER PLATE WHEN DIAL IS ASSEMBLED ON SHAFT. LOCK SECURELY WITH 207782 SET SCREW. INSERT 207775 RANGE INDICATOR SO THE LETTER "A" MAY BE SEEN AT RANGE OPENING IN COVER PLATE.

REPEAT PROCEDURE-DUAL FEED PANEL.

*OPTIONAL SPACERS (PART NO. 211026) ARE AVAILABLE TO PROVIDE THE FOLLOWING MAXIMUM FLOW RATES:

NUMBER OF SPACERS	APPROXIMATE MAXIMUM CONTROLLED FLOW (CU. IN/MIN.)	
	FINE FEED	COARSE FEED
4	100	400
3	300	800
2	700	1200
1	1100	1400

■THESE PARTS ARE USED ONLY ON THE SINGLE FEED PANEL CPGD-06-*A-12. THEY MUST BE REMOVED IF THE PANEL IS BEING CONVERTED TO DUAL FEED TYPE.

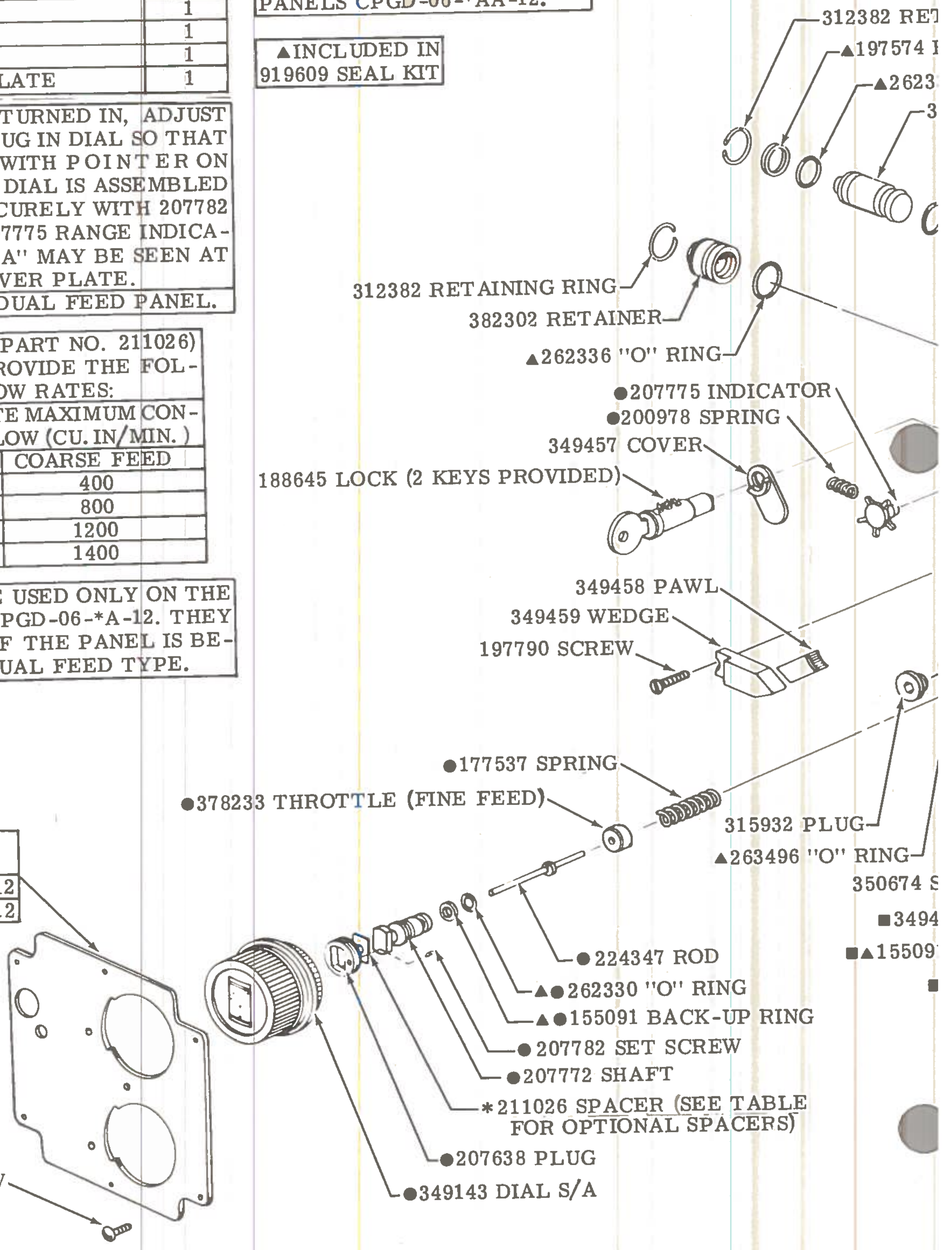
COVER PLATE	MODEL
375647	■CPGD-06-A-12
375643	CPGD-06-AA-12

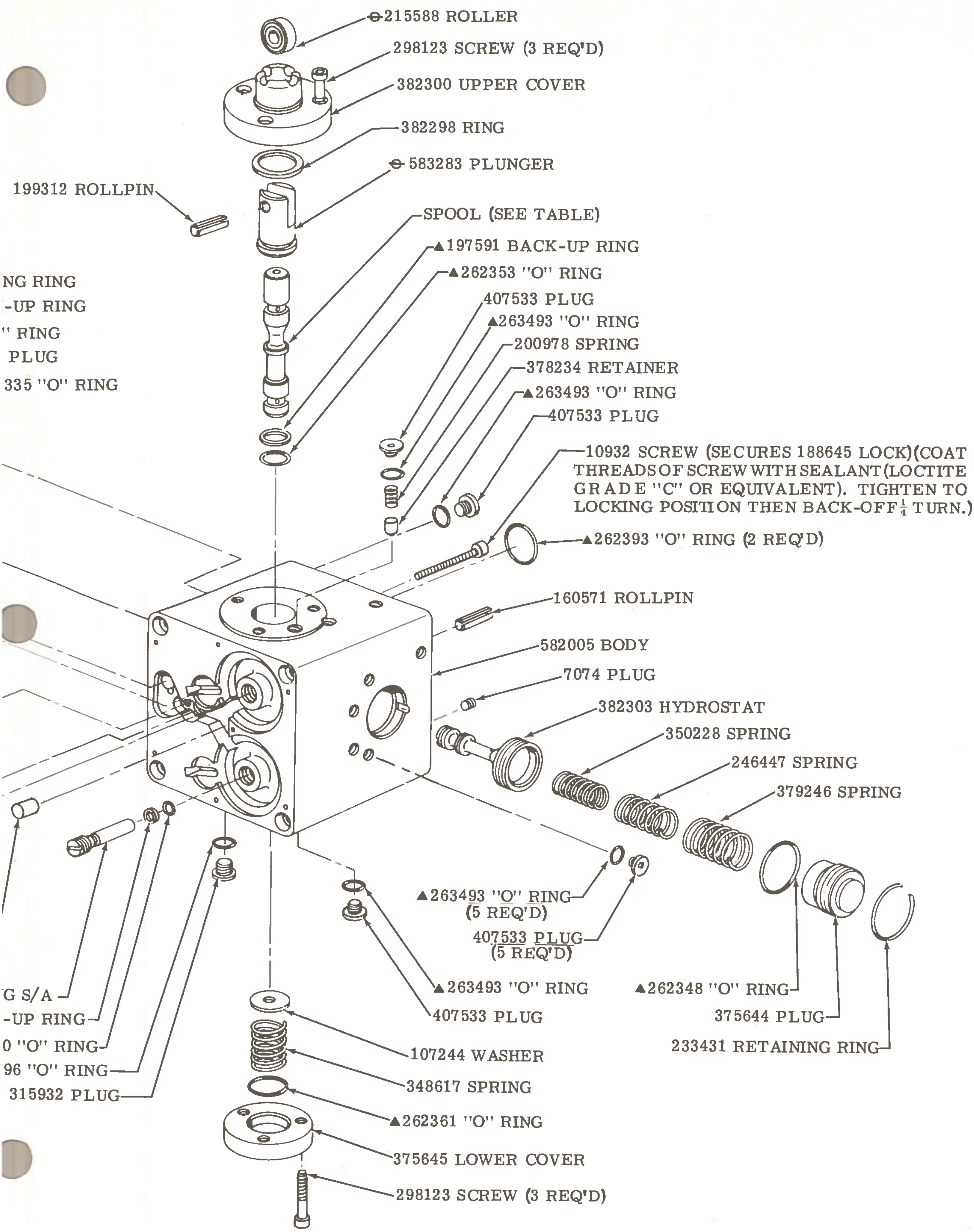
⊖215588 ROLLER AND 583283 PLUNGER CAN BE POSITIONED AT RIGHT ANGLES TO THE MOUNTING FACE. TAP OUT ROLLPIN, REMOVE ROLLER AND TURN PLUNGER CLOCKWISE (CW) 90°. INSTALL ROLLER AND PIN. (SEE MODEL CODE)

SPOOL	RATED FLOW	MODEL
374889	10 GPM	CPGD-06-10A(A)-12
374890	15 GPM	CPGD-06-15A(A)-12
374891	20 GPM	CPGD-06-20A(A)-12
374892	30 GPM	CPGD-06-30A(A)-12

●2 REQUIRED ON DUAL FEED PANELS CPGD-06-*AA-12.

▲INCLUDED IN 919609 SEAL KIT



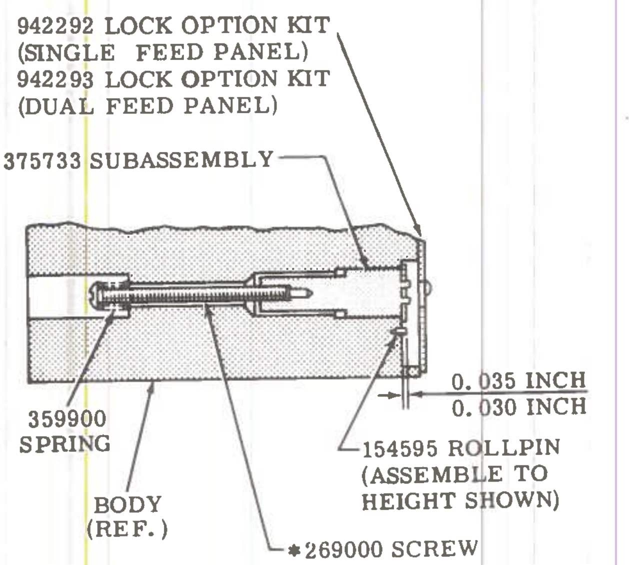


⊖215588 ROLLER
298123 SCREW (3 REQ'D)
382300 UPPER COVER
382298 RING
⊖583283 PLUNGER
199312 ROLLPIN
SPOOL (SEE TABLE)
▲197591 BACK-UP RING
▲262353 "O" RING
407533 PLUG
▲263493 "O" RING
200978 SPRING
378234 RETAINER
▲263493 "O" RING
407533 PLUG
10932 SCREW (SECURES 188645 LOCK)(COAT THREADS OF SCREW WITH SEALANT (LOCTITE GRADE "C" OR EQUIVALENT). TIGHTEN TO LOCKING POSITION THEN BACK-OFF 1/4 TURN.)
▲262393 "O" RING (2 REQ'D)
160571 ROLLPIN
582005 BODY
7074 PLUG
382303 HYDROSTAT
350228 SPRING
246447 SPRING
379246 SPRING
NG RING
-UP RING
" RING
PLUG
335 "O" RING
▲263493 "O" RING (5 REQ'D)
407533 PLUG (5 REQ'D)
▲263493 "O" RING
407533 PLUG
▲262348 "O" RING
375644 PLUG
233431 RETAINING RING
G S/A
-UP RING
0 "O" RING
96 "O" RING
315932 PLUG
107244 WASHER
348617 SPRING
▲262361 "O" RING
375645 LOWER COVER
298123 SCREW (3 REQ'D)

MODEL CODE BREAKDOWN

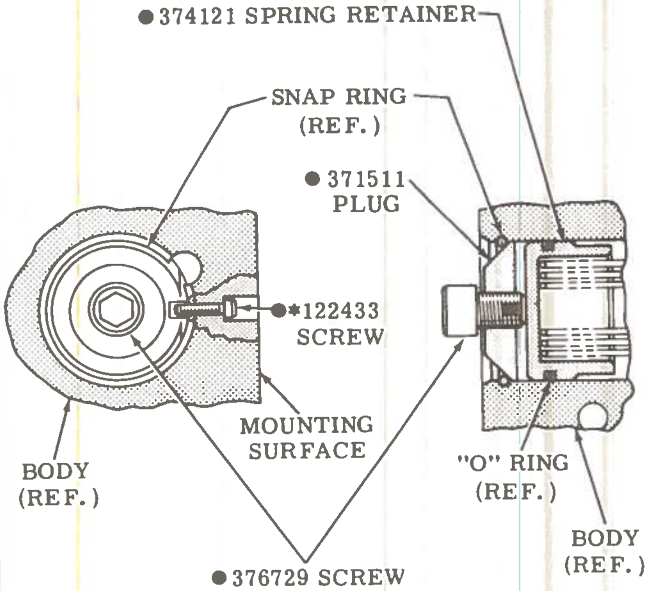
CP G D - 06 -- (L) - (T) - 12 (S1)**

- CP — CONTROL PANEL
- G — GASKET MOUNTED
- D — REGENERATIVE
- 06 — 3/4" VALVE SIZE 60 SERIES
- * — SPOOL CAPACITY USGPM
  - 10 - 10
  - 15 - 15
  - 20 - 20
  - 30 - 30
- * — VALVE TYPE
  - A - SINGLE FEED
  - AA - DUAL FEED
- (L) — L - LOCK OPTIONS; OMIT FOR STANDARD LOCK
- (T) — T - TRIM ADJUSTMENT; OMIT FOR NO TRIM ADJUSTMENT
- 12 — DESIGN
- (S1) — ROLLER AT RIGHT ANGLES TO MOUNTING FACE



NOTE
COAT THREADS OF *SCREW WITH SEALANT (LOCTITE GRADE "C" OR EQUIVALENT). TIGHTEN TO LOCKING POSITION THEN BACK-OFF 1/4 TURN.

LOCK OPTION
MODELS CPGD-06-**-L-*-12



● INCLUDED IN 942294 TRIM ADJ. KIT

NOTE
COAT THREADS OF *SCREW WITH SEALANT (LOCTITE GRADE "C" OR EQUIVALENT). TIGHTEN TO LOCKING POSITION.

TRIM ADJUSTMENT OPTION
MODELS CPGD-06-**-*-T-12

To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

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VICKERS®
A TRINOVA COMPANY

Service Parts Information

Single & Dual Feed Control Panels

CPG-06-*A-*-*-12
CPG-06-*AA-*-*-12

Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 11-1-85 I-3608-S

CONVERSION OF A SINGLE FEED PANEL TO ADUAL FEED PANEL IS ACCOMPLISHED BY INSTALLING CONVERSION KIT 942245. THE KIT CONTAINS THE FOLLOWING PARTS:		
PART NO.	NAME	QTY.
155091	BACK-UP RING	1
177537	SPRING	1
200978	SPRING	1
207638	PLUG	1
207772	SHAFT	1
207775	INDICATOR	1
207782	SET SCREW	1
224347	ROD	1
224352	THROTTLE (COARSE)	1
262330	"O" RING	1
349143	DIAL S/A	1
349458	PAWL	1
380232	COVER PLATE	1

WITH 207772 SHAFT TURNED IN, ADJUST 207638 POSITIONING PLUG IN DIAL SO THAT "O" ON DIAL LINES UP WITH POINTER ON COVER PLATE WHEN DIAL IS ASSEMBLED ON SHAFT. LOCK SECURELY WITH 207782 SET SCREW. INSERT 207775 RANGE INDICATOR SO THE LETTER "A" MAY BE SEEN AT RANGE OPENING IN COVER PLATE.

REPEAT PROCEDURE-DUAL FEED PANEL.

*OPTIONAL SPACERS (PART NO. 211026) ARE AVAILABLE TO PROVIDE THE FOLLOWING MAXIMUM FLOW RATES:

NUMBER OF SPACERS	APPROXIMATE MAXIMUM CONTROLLED FLOW (CU.IN./MIN.)	
	FINE FEED	COARSE FEED
4	100	400
3	300	800
2	700	1200
1	1100	1400

■THESE PARTS ARE USED ONLY ON THE SINGLE FEED PANEL CPG-06-*A-12. THEY MUST BE REMOVED IF THE PANEL IS BEING CONVERTED TO DUAL FEED TYPE.

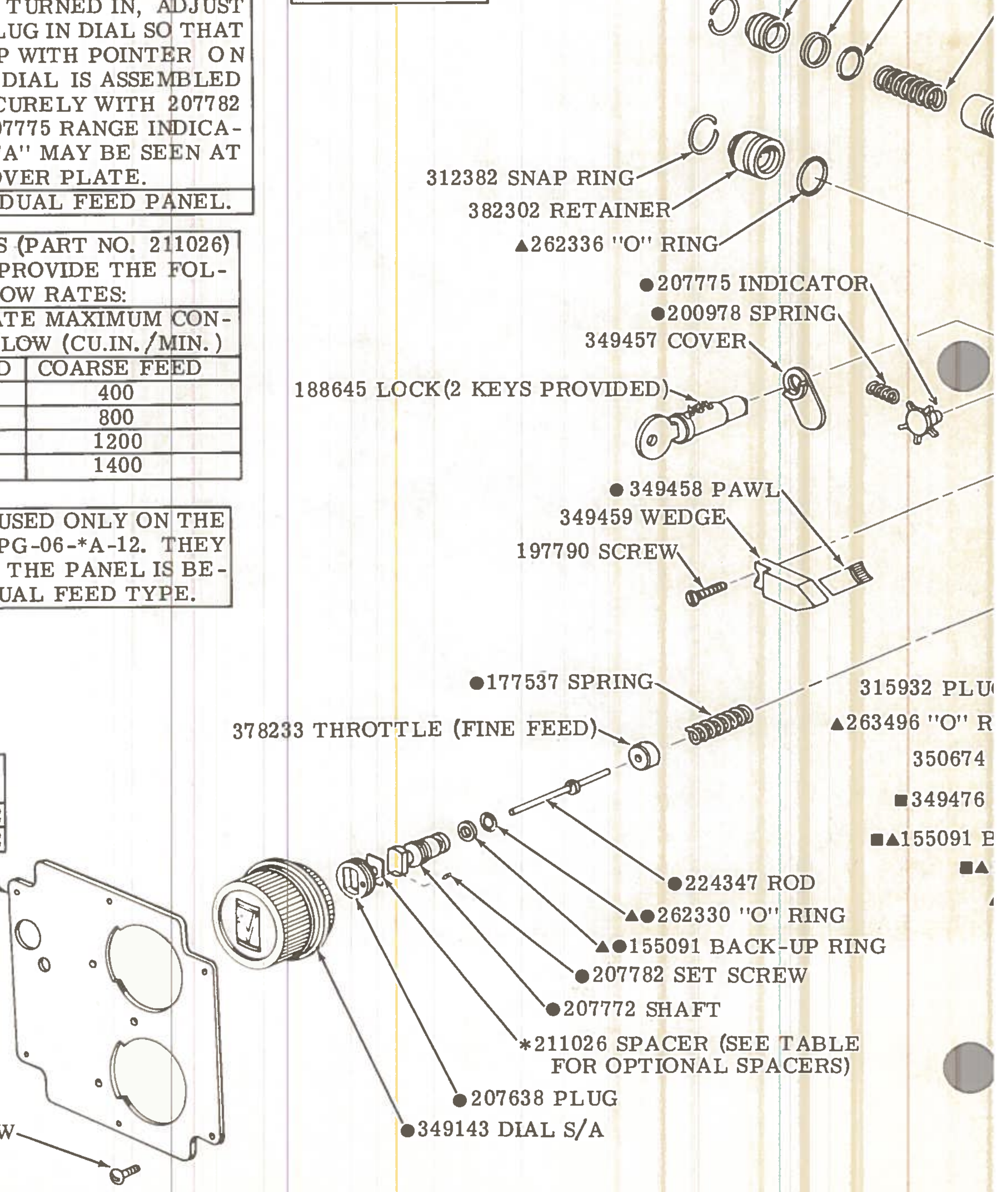
COVER PLATE	MODEL
380234	CPG-06-A-12
380232	CPG-06-AA-12

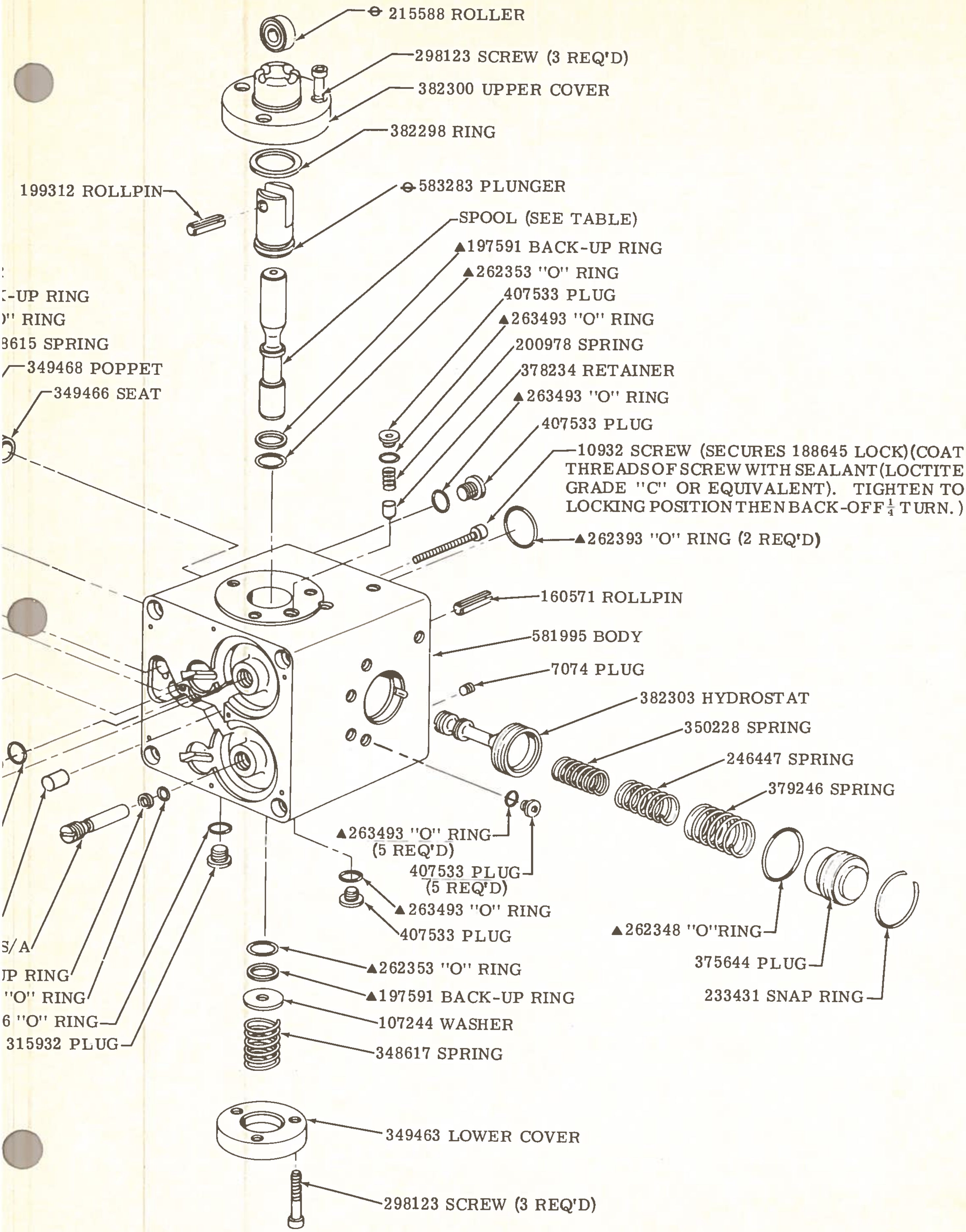
⊖215588 ROLLER AND 583283 PLUNGER CAN BE POSITIONED AT RIGHT ANGLES TO THE MOUNTING FACE. TAP OUT ROLLPIN, REMOVE ROLLER AND TURN PLUNGER CLOCKWISE (CW) 90º. INSTALL ROLLER AND PIN. (SEE MODEL CODE)

SPOOL	RATED FLOW USGPM	MODEL
352434	10	CPG-06-10A(A)-12
352435	15	CPG-06-15A(A)-12
352436	20	CPG-06-20A(A)-12
352450	30	CPG-06-30A(A)-12

●2 REQUIRED ON DUAL FEED PANELS CPG-06-*AA-12.

▲INCLUDED IN 919609 SEAL KIT



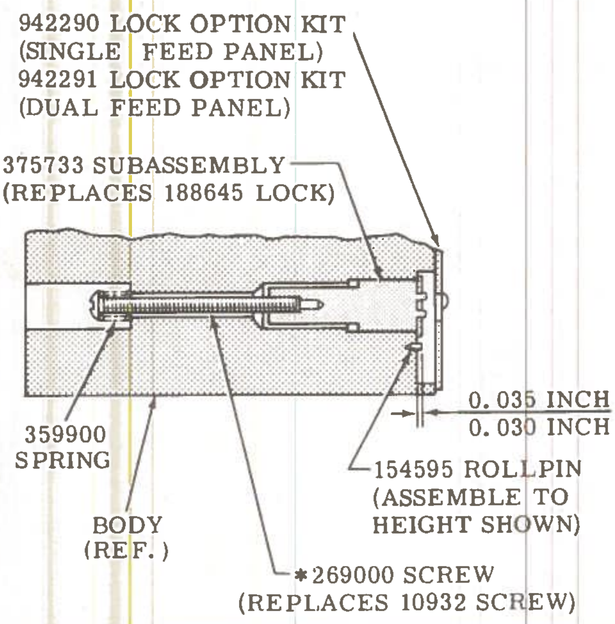


215588 ROLLER
298123 SCREW (3 REQ'D)
382300 UPPER COVER
382298 RING
199312 ROLLPIN
583283 PLUNGER
SPOOL (SEE TABLE)
▲197591 BACK-UP RING
▲262353 "O" RING
407533 PLUG
▲263493 "O" RING
200978 SPRING
378234 RETAINER
▲263493 "O" RING
407533 PLUG
-UP RING
" RING
8615 SPRING
349468 POPPET
349466 SEAT
10932 SCREW (SECURES 188645 LOCK)(COAT THREADS OF SCREW WITH SEALANT (LOCTITE GRADE "C" OR EQUIVALENT). TIGHTEN TO LOCKING POSITION THEN BACK-OFF ¼ TURN.)
▲262393 "O" RING (2 REQ'D)
160571 ROLLPIN
581995 BODY
7074 PLUG
382303 HYDROSTAT
350228 SPRING
246447 SPRING
379246 SPRING
▲263493 "O" RING (5 REQ'D)
407533 PLUG (5 REQ'D)
▲263493 "O" RING
407533 PLUG
▲262348 "O"RING
375644 PLUG
233431 SNAP RING
S/A
P RING
"O" RING
6 "O" RING
315932 PLUG
▲262353 "O" RING
▲197591 BACK-UP RING
107244 WASHER
348617 SPRING
349463 LOWER COVER
298123 SCREW (3 REQ'D)

MODEL CODE BREAKDOWN

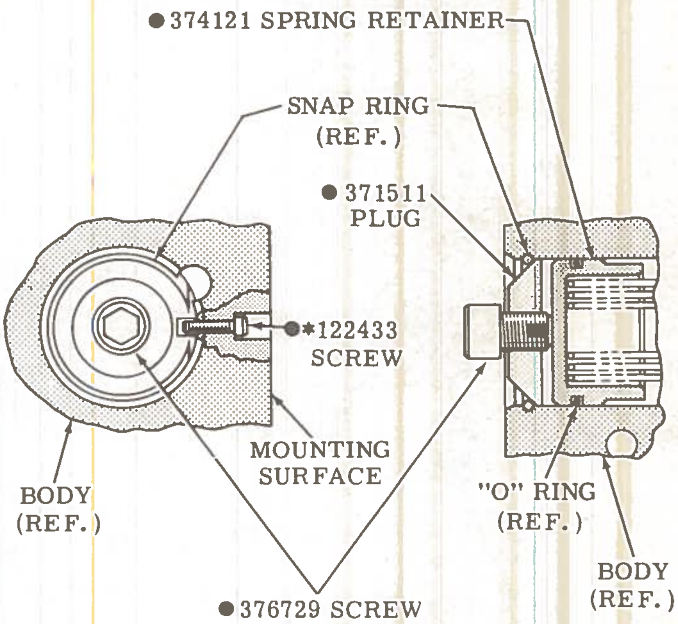
CP G - 06 - ** - (L) - (T) - 12 (S1)

- CP — CONTROL PANEL
- G — GASKET MOUNTED
- 06 — 3/4" VALVE SIZE 60 SERIES
- ** — SPOOL CAPACITY USGPM
  - 10 - 10
  - 15 - 15
  - 20 - 20
  - 30 - 30
- ** — VALVE TYPE
  - A - SINGLE FEED
  - AA - DUAL FEED
- (L) — L - LOCK OPTION; OMIT FOR STANDARD KEYED LOCK
- (T) — T - TRIM ADJUSTMENT; OMIT FOR NO TRIM ADJUSTMENT
- 12 — DESIGN
- (S1) — ROLLER AT RIGHT ANGLES TO MOUNTING FACE



NOTE
COAT THREADS OF *SCREW WITH SEALANT (LOCTITE GRADE "C" OR EQUIVALENT). TIGHTEN TO LOCKING POSITION THEN BACK-OFF 1/4 TURN.

LOCK OPTION
MODELS CPG-06-**-L-*-12



● INCLUDED IN 942294 TRIM ADJ. KIT

NOTE
COAT THREADS OF * SCREW WITH SEALANT (LOCTITE GRADE "C" OR EQUIVALENT). TIGHTEN TO LOCKING POSITION.

TRIM ADJUSTMENT OPTION
MODELS CPG-06-**-*-T-12

To insure sustained efficiency and maximum trouble-free life of this precision equipment, initial and continuous filtration of the fluid medium to 25 microns absolute or less is essential. (For information pertaining to Vickers economical filters, see bulletin 81-216.)

Litho in U. S. A.

Service Parts Information

ELECTRICAL FEATURES & OPTIONS

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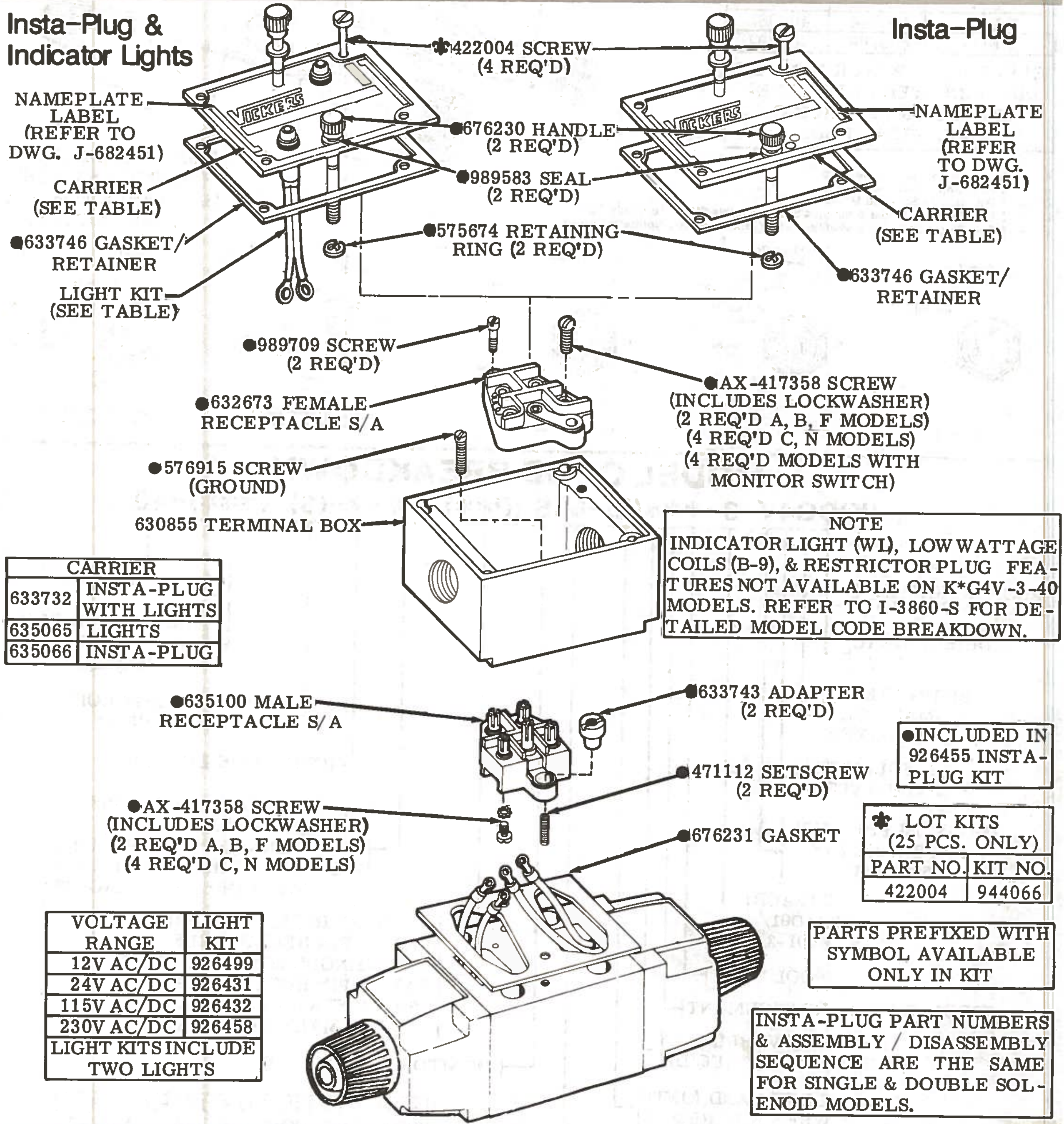
(K)DG4V-3-***(L)-M(S)(P**)-**-*-40



CARRIER	
633732	INSTA-PLUG WITH LIGHTS
635065	LIGHTS
635066	INSTA-PLUG

NOTE
INDICATOR LIGHT (WL), LOW WATTAGE COILS (B-9), & RESTRICTOR PLUG FEATURES NOT AVAILABLE ON K*G4V-3-40 MODELS. REFER TO I-3860-S FOR DETAILED MODEL CODE BREAKDOWN.

●INCLUDED IN 926455 INSTA-PLUG KIT

✱ LOT KITS (25 PCS. ONLY)	
PART NO.	KIT NO.
422004	944066

VOLTAGE RANGE	LIGHT KIT
12V AC/DC	926499
24V AC/DC	926431
115V AC/DC	926432
230V AC/DC	926458
LIGHT KITS INCLUDE TWO LIGHTS	

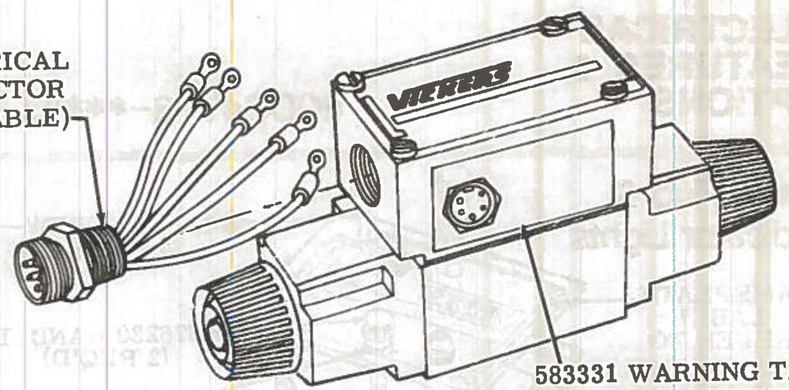
PARTS PREFIXED WITH SYMBOL AVAILABLE ONLY IN KIT

INSTA-PLUG PART NUMBERS & ASSEMBLY / DISASSEMBLY SEQUENCE ARE THE SAME FOR SINGLE & DOUBLE SOLENOID MODELS.

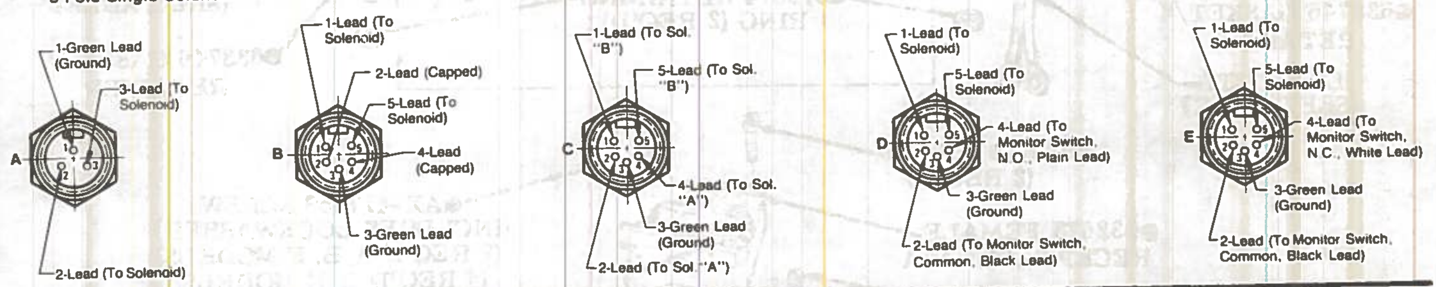
Electrical Connector & Wiring Diagram

CONNECTOR TYPE	PART NUMBER	WARNING TAG
3 PIN	400784	400881
5 PIN	409706	400882

ELECTRICAL POWER MUST BE DISCONNECTED BEFORE REMOVING OR REPLACING ELECTRICAL PLUG



A — 3 Pole Single Solenoid Models
B — 5 Pole Single Solenoid Models
C — 5 Pole Double Solenoid Models
D — 5 Pole Single Solenoid & Monitor Switch Models (Wired Normally Open)
E — 5 Pole Single Solenoid & Monitor Switch Models (Wired Normally Closed)



MODEL CODE BREAKDOWN

(K)DG4V-3-*(L)-M(S)(P**)-**-*-(9)-(***)-40**

- (K) — PROPORTIONAL VALVE
- D — DIRECTIONAL VALVE
- G — SUBPLATE OR MANIFOLD MOUNTED
- 4 — SOLENOID OPERATED
- V — MAXIMUM PRESSURE RATING 350 bar (5000 PSI)
- 3 — INTERFACE NFPA/D01/ ISO-4401-3
- *** — SPOOL TYPE; SPOOL SPRING ARRANGEMENT; MANUAL OVERRIDE (OMIT WHEN NOT REQ'D)
- (L) — LEFT HAND (OMIT WHEN NOT REQ'D)
- M — FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS
- (S) — MONITOR SWITCH
- (P**) — ELECTRICAL FEATURES
  - PA3 - 3 PIN RECEPTACLE (SINGLE SOLENOID ONLY)
  - PA5 - 5 PIN RECEPTACLE
  - PB - INSTA-PLUG MALE & FEMALE RECEPTACLE
- ** — ELECTRICAL OPTIONS
  - U - DIN 43650 COIL
  - W - WIRING HSG. ½ NPT. THD.
  - WL - WIRING HSG. ½ NPT. THD. (WITH INDICATOR LIGHTS)
- * — COIL CODE LETTER
- (9) — LOW WATTAGE COIL (B COIL ONLY)
- (***) — RESTRICTOR PLUG (OMIT WHEN NOT REQUIRED)
- 40 — DESIGN

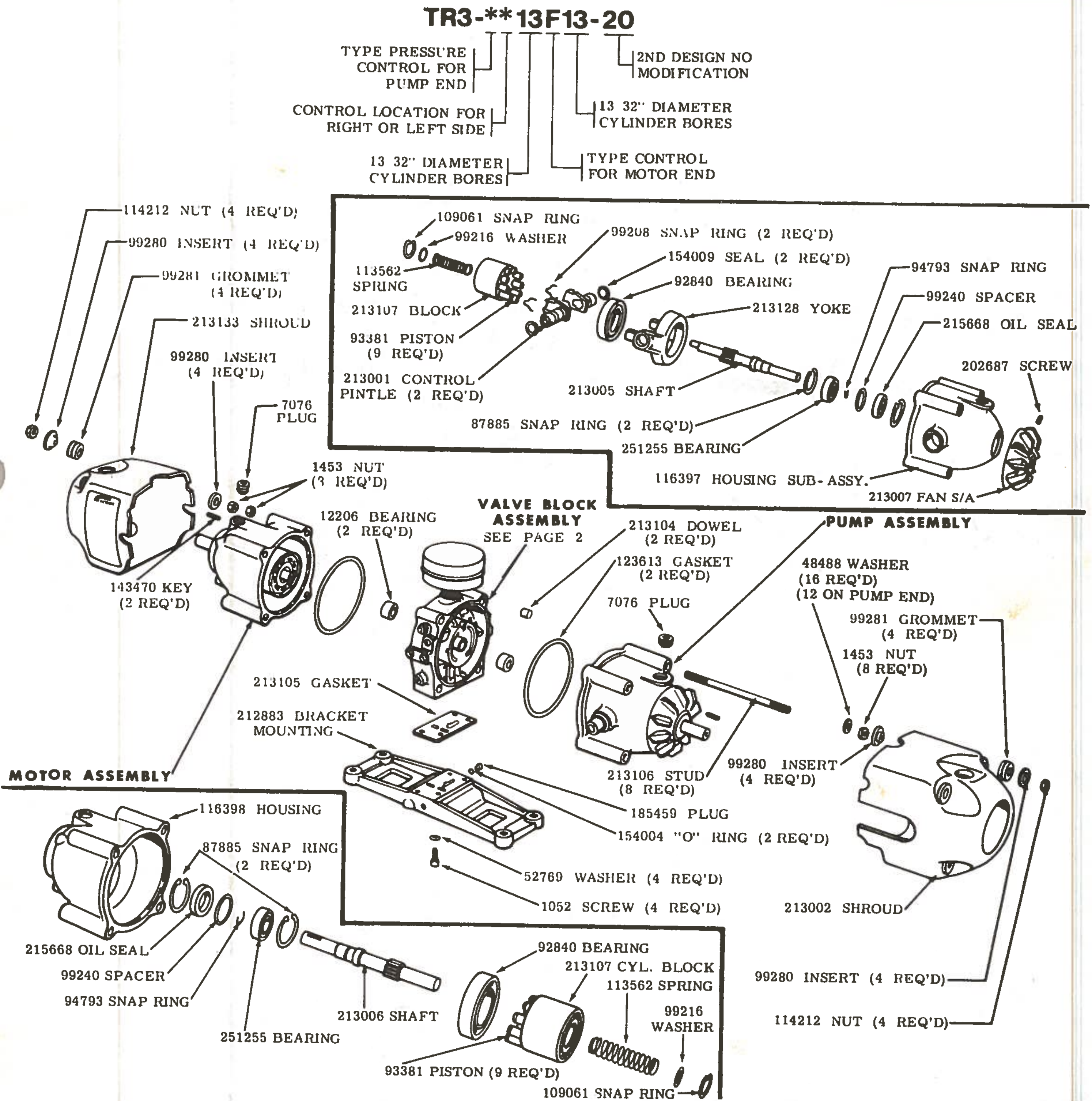
NOTE - REFER TO SPECIFIC PARTS DWG. FOR MORE DETAILED MODEL CODE BREAKDOWN.

Litho in U. S. A.

Service Parts Information

ADJUSTABLE SPEED DRIVES

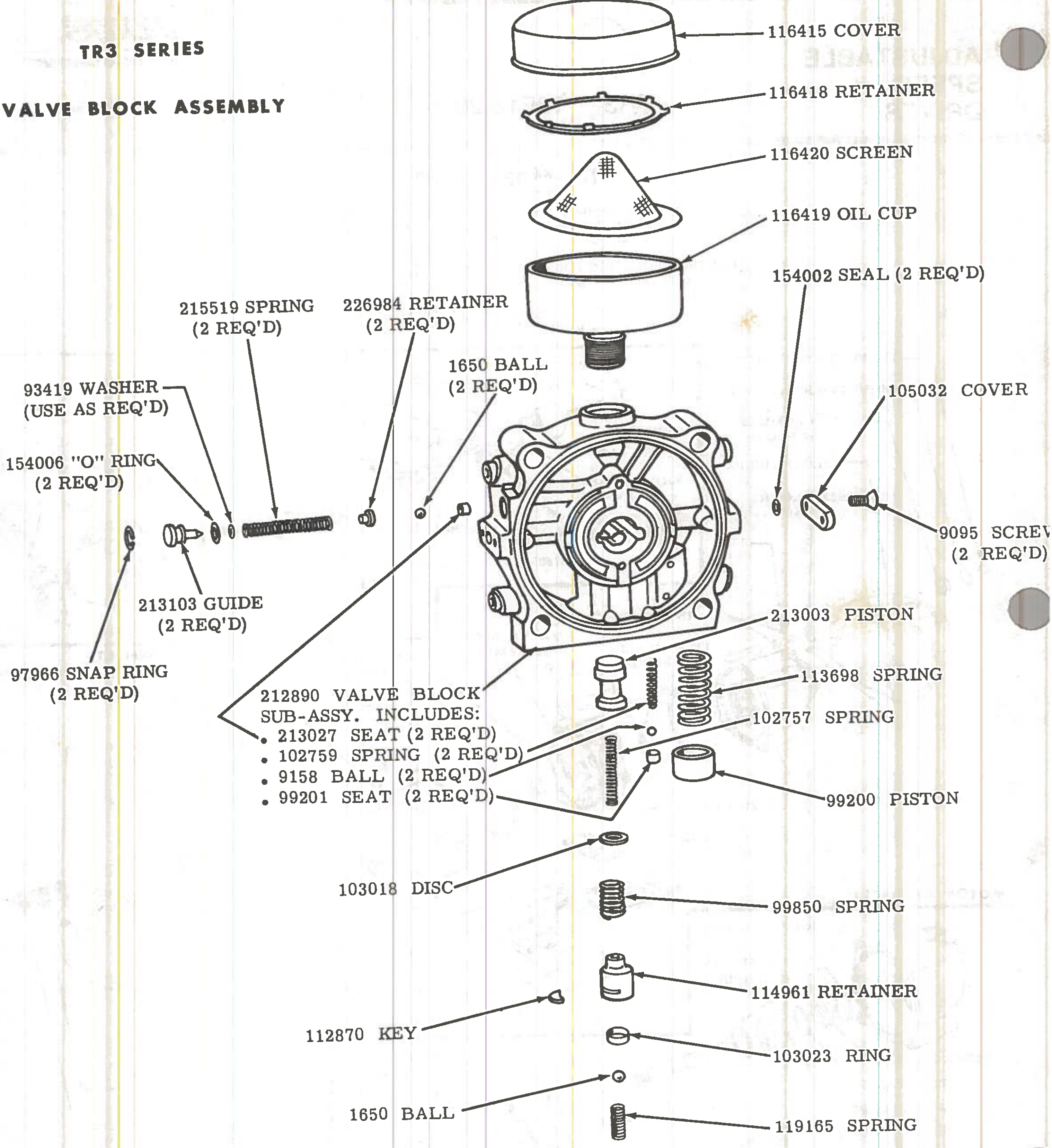
TR3-**13F13-20



Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48084

TR3 SERIES

VALVE BLOCK ASSEMBLY



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

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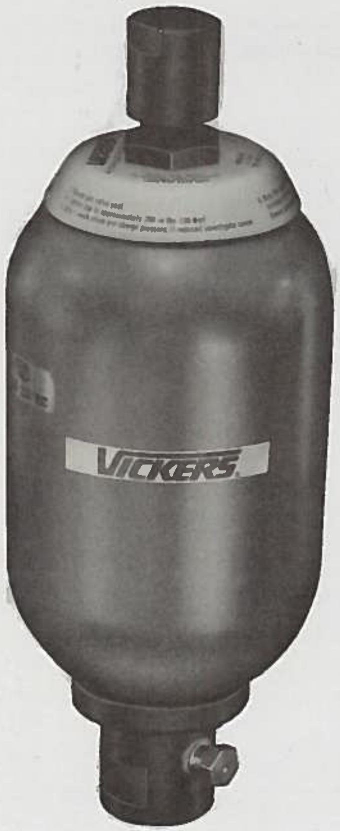
Service Parts Information

Bladder Type Accumulators

(F3) A1-75-30
(F3) A1-200-30
(F3) A1-550-30
(F3) A1-1050-30
(F3) A1-2050-30



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 8-1-88 I-3986-S

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SECTION I – INTRODUCTION

A. PURPOSE OF MANUAL

This manual provides operating instructions and overhaul information for Vickers -30 design bladder type accumulators. Information contained herein pertains to the latest design series as listed in Table 1.

Model	Assembly No.
A1-75-30	633100
A1-200-30	633101
A1-550-30	633102
A1-1050-30	633103
A1-2050-30	633104

Table 1. Model Series

B. RELATED PUBLICATIONS

Service part information is included in this manual. Installation and performance specifications are not covered in this manual. Overall dimensions and performance data are shown on installation drawing 521801. The installation drawing is available from any Vickers sales engineering office or from:

Vickers, Incorporated
Technical Publications
1401 Crooks Road
Troy, Michigan 48084

C. MODEL CODE

Variations within each model series are described in the model code. The model code is stamped on the accumulator nameplate. See Table 2.

F3	A1 –	* * * *			-30
Seals for Mineral Oil and Fire Resistant Fluids	Accumulator Bladder Type	Nominal Size	(Gas Capacity - in.³)	(Fluid Capacity - Gal.)	Design
		75	61	¼	
		200	213.6	1	
		550	579.7	2.5	
		1050	1067.9	5	
		2050	2044.2	10	

Table 2. Model Code

Section II – DESCRIPTION

A. GENERAL DESCRIPTION

Vickers industrial type accumulators are made of seamless steel alloy that is shaped into a cylindrical form having spherical ends. Each accumulator contains a Buna type rubber bladder. The bladder is precharged through the valve core with nitrogen gas. The opposite end of the accumulator contains an oil valve which connects into the hydraulic circuit. The oil valve has an SAE straight thread connection. The bladder is protected from wear at the oil valve end by a rubber sealing ring. This sealing ring helps prevent scuffing of the bladder during operation. The shell interior has a 500 micro finish that increases bladder life. Figure 1 is a typical cross sectional view of a -30 design bladder type accumulator.

B. OPERATION

Operation of the accumulator is automatic. A combination of oil, which is virtually non-compressible, and nitrogen, which can both expand and compress, make the accumulator work. As oil is pumped into the accumulator, it forces the gas to compress until resistance of the gas equals the oil pressure. When the hydraulic system needs oil, the compressed gas forces oil from the accumulator to maintain system flow.

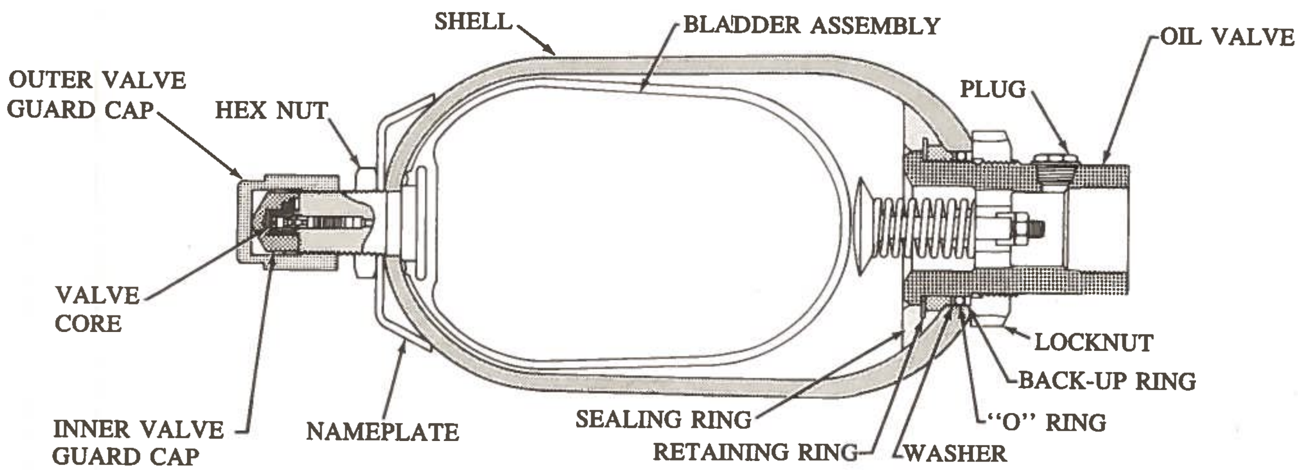


Figure 1. Sectional View

Section III – INSTALLATION & MAINTENANCE

A. INSTALLATION

All Vickers accumulators have female connections. If it is necessary to adapt to smaller fittings, forged steel reducer bushings should be used. Vertical mounting of the accumulator is recommended, but horizontal mounting is permissible. A1-75-30 and A1-200-30 accumulators may be mounted in a line unsupported, providing the line can support the charged accumulator and is free from excessive vibration. Supports should be provided whenever possible. Large size accumulators *must* be supported.

NOTE

Before an accumulator is installed in a hydraulic circuit, it should be inspected, supplied with lubrication oil, and pre-charged with nitrogen gas. Refer to Section IV for the accumulator precharge procedure.

CAUTION

NEVER USE OXYGEN GAS IN AN ACCUMULATOR.

NOTE

When the accumulator is installed in a hydraulic circuit, make sure the accumulator lock nuts and the bleeder plug are tight.

B. PLACING ACCUMULATOR IN SERVICE

After a hydraulic circuit has been opened by alterations to the circuit, the circuit should be purged of air. This is accomplished by purging the circuit at its highest point while intermittently operating its components. If purging is desired in the area of the accumulator, it may be accomplished through the optional bleeder plug located on the side of the oil valve. A ¼ NPTF plug is standard.

CAUTION

DO NOT REMOVE THE BLEEDER PLUG (4) FROM THE ACCUMULATOR. Caution must be used when loosening the bleeder plug, as the oil is under high pressure. Use the bleeder plug to remove extrained air from the accumulator portion of the circuit.

C. PRODUCT LIFE

The service life of this product is dependent upon environment, duty cycle, operating parameters and system cleanliness. Since these parameters vary from application to application, the user must determine and establish the periodic maintenance required to maximize life and detect potential component failure.

Section IV – PRECHARGING PROCEDURE

Precharge the accumulator with nitrogen gas as follows:

1. Remove the outer and inner valve guard cap from the gas valve.

2. Attach a charging hose assembly directly from the nitrogen bottle to the accumulator. Turn the 'T' bar handle inward to depress the valve core of the bladder. See Figure 2 for charging hose connections. Refer to Table 3 for the appropriate accumulator charging and gauge assemblies.

Model	Ass'y.	Nomenclature
ACGH-0-L-10	579309	No gauge - L.H. female thd.
ACGH-1500-L-10	179442	1500 PSI liquid filled gauge, L.H. female thd.
ACGH-3000-L-10	179443	3000 PSI liquid filled gauge, L.H. female thd.
ACGH-O-R-10	579310	No gauge - R.H. male thd.
ACGH-1500-R-10	579311	1500 PSI liquid filled gauge, R.H. male thd.
ACGH-3000-R-10	579312	3000 PSI liquid filled gauge, R.H. male thd.

Table 3. Accumulator Charging & Gauging Assemblies

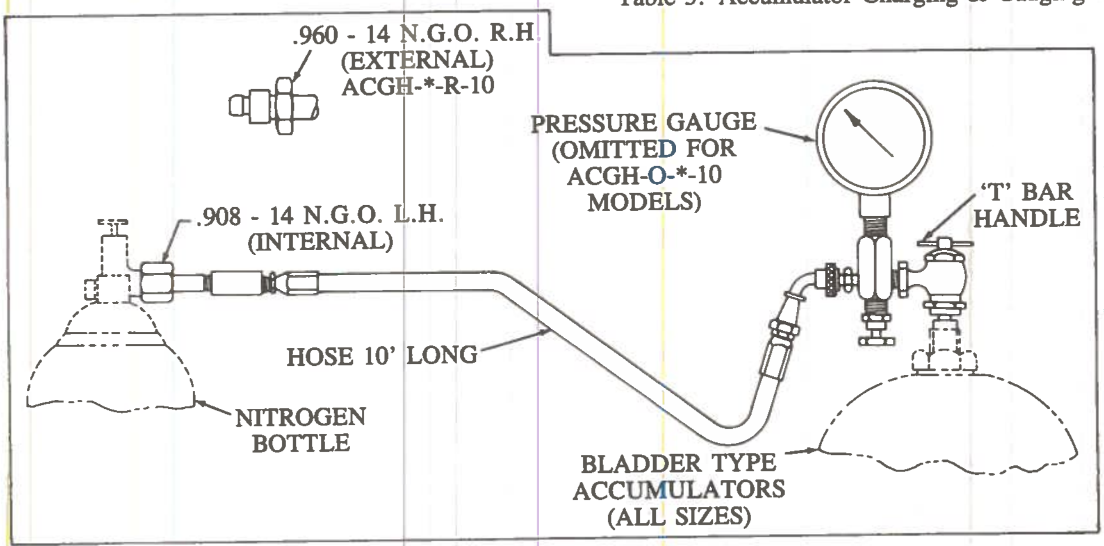


Figure 2. Accumulator Charging & Gauging Device.

3. Open the valve on the nitrogen bottle slowly allowing nitrogen to flow to the accumulator. Intermittently close the valve to allow the accumulator gauge to settle. Precharge pressure will vary with each application, but must not be less than one quarter (¼) or preferably one third (⅓) of the maximum working pressure.

If an accumulator is to be used for absorbing pump pulsations or line shocks, it should be precharged to 60 percent of the mean line pressure and installed as near the source of shock as possible.

4. When the required pressure is reached, maintain for two minutes then read the gauge again. As the nitrogen equalizes in the accumulator, a slight pressure drop will be observed. Slowly open the charging valve again and bring pressure up to the desired reading.

5. Close valve on the nitrogen bottle securely. Turn the "T" bar handle at the accumulator outward to release the valve core, then remove the charging hose assembly.

6. Carefully test accumulator gas connection for leakage by pouring system fluid in and around the valve core area. Tighten any loose connections. If the core leaks, depress and release the core rapidly to reseat the valve core. No leakage can be tolerated in this area. Replace the core if leakage cannot be stopped.

7. Install a shut-off valve between the accumulator oil port and the main line. Action of the accumulator on the hydraulic circuit can be stopped by means of this valve. Another shut-off valve should be installed between the accumulator and the reservoir. These valves provide a means of isolating and draining the accumulator in the event that servicing is required.

8. Install the accumulator in an accessible location for ease of maintenance.

9. Install a check valve between the pump and accumulator to prevent pump reversal. Other valves may be installed between the check valve and the pump for unloading after maximum circuit pressure is attained.

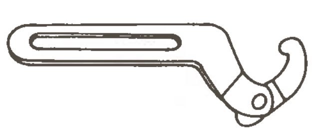
10. *DO NOT* weld supports to the accumulator shell.

Section V – OVERHAUL

A. SERVICE TOOLS

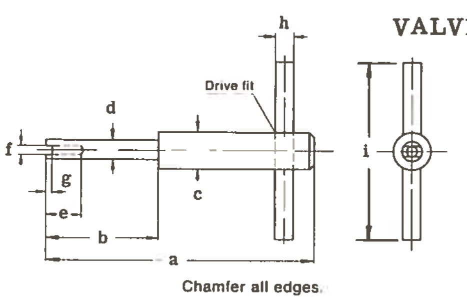
The following list of service tools are required to overhaul a Vickers bladder type accumulator. Special service tools are shown in Figure 3.

1. 10" adjustable wrench
2. A small, thin blade screwdriver
3. A medium size screwdriver
4. Compressed air
5. Cleaning solvent (methylated spirits or water)
6. Soap solution with brush applicator
7. Heavy duty vise with padded jaws (use on smaller accumulators)
8. Chain vise (use on larger accumulators)
9. A clean, sturdy work bench
10. Spanner wrench (see Figure 3)
11. Valve core tool (see Figure 3)
12. Clean, system fluid
13. Safety glasses
14. A medium size funnel
15. Nitrogen gas
16. Accumulator charging devise (see Figure 2 and Table 3)
17. Flashlight



905092
SPANNER
WRENCH

VALVE CORE TOOL



Dim.	Inch	mm
a	2.360	60.0
b	.984	25.0
c	.323	8.2
d	.165	4.2
e	.315	8.0
f	.078	2.0
g	.059	1.5
h	.157	4.0
i	1.250	32.0

Figure 3. Special Service Tools

B. TROUBLESHOOTING GUIDE

CAUTION
Make sure the accumulator is not subject to hydraulic pressure before removing it from the circuit.

The following chart (Table 4) provides types of accumulator problems, probable causes, and repair solutions. In most cases, accumulator overhaul requires the replacement of the bladder and anti-extrusion ring assembly. Note that improper operating conditions may cause accumulator failure. If this is the case, make sure that the operating conditions are corrected before placing the accumulator into service.

TYPE OF PROBLEM	PROBABLE CAUSE	REPAIR SOLUTION
External Leakage:		
1. Gas valve leaks.	Damaged or broken gas valve core.	Replace valve core or bladder.
2. Gas valve leaks.	Loose connection at accumulator gas valve.	Tighten connection.
3. Oil valve leaks.	Damaged or missing seals.	Replace with new anti-extrusion ring kit.
4. Oil valve leaks.	Loose connection, damaged threads, improper oil valve function.	Tighten connection or replace oil valve.
Internal Leakage:		
1. Bladder leaks at vulcanized seam.	Foreign material introduced into bladder Manufacturing or material fault.	Replace bladder. Check system for cleanliness.
2. Bladder is charred, brittle, or porous.	Working pressure ratio too high causing excessive nitrogen and oil temperature.	Replace bladder. Check working pressure parameters.
3. Cracks at center portion of bladder.	Material fatigue.	Replace bladder.
4. Hole in bladder.	Damaged at assembly, or charge pressure too low causing hole in bladder.	Replace bladder. Check accumulator charge pressure.

Table 4. Troubleshooting Guide

C. DISASSEMBLY

Disassemble the accumulator by item sequence number as shown in Figure 4. Place accumulator parts on a clean surface for inspection.

CAUTION
WEAR SAFETY GLASSES TO PREVENT POSSIBLE EYE INJURY.

1. For smaller size accumulators, clamp the oil valve (10) portion of the accumulator in a heavy duty vise. Protect the oil valve by inserting two flat pieces of steel between the oil valve and the vise jaws. For larger size accumulators, secure the accumulator in a chain vise.

2. Remove outer and inner valve guard cap (1 & 2) to expose core (3).

3. Press on valve core (3) to release gas from the accumulator bladder.

4. Remove valve core (3) with the valve core tool shown in Figure 3.

5. Loosen hex nut (11).

6. Remove slotted nut (4) with a spanner wrench.

7. Remove accumulator from vise and secure on a clean, sturdy work bench.

8. Remove and discard back-up ring (5), o-ring (6), and washer (7) from oil valve (10). Use a thin bladed screwdriver.

9. Push oil valve (10) into accumulator shell (14) until retaining ring (8) and sealing ring (9) are exposed.

10. Reach into shell and align the two flat surfaces of retaining ring (8) with shell opening. Remove retaining ring from shell.

11. Reach into shell and remove sealing ring (9) from shell. Bend or compress the sealing ring to facilitate removal.

12. Remove oil valve (10) from shell (14).

13. Remove hex nut (11) and nameplate (12).

14. Reach into shell opening and remove bladder (13). Slightly fold and twist the bladder for easier removal. If the bladder is very slippery, hold onto bladder with a clean rag.

Item No.	Part Name	Part Numbers				
		Model A1-75-30 (1 Quart)	Model A1-200-30 (1 Gallon)	Model A1-550-30 (2.5 Gallon)	Model A1-1050-30 (5 Gallon)	Model A1-2050-30 (10 Gallon)
1	Outer Valve Guard Cap ⊖ ●	682428	682428	682428	682428	682428
2	Inner Valve Guard Cap ⊖ ●	682427	682427	682427	682427	682427
3	Valve Core ●	682450	682450	682450	682450	682450
11	Hex Nut ●	682426	682426	682426	682426	682426
12	Nameplate	682415	633106	633107	633107	633107
13	Bladder Assembly STD. ● F3	926380 926573	926381 926574	926382 926575	926383 926576	926384 926577
14	Shell (Not for sale)	—	—	—	—	—
4	Slotted Nut ○	○(STD.) 926385 (F3) 926578	○(STD.) 926386 (F3) 926579	○(STD.) 926387 (F3) 926580	○(STD.) 926387 (F3) 926580	○(STD.) 926387 (F3) 926580
5	Backup Ring ○					
6	"O" Ring ■ ○					
7	Washer ○					
8	Retaining Ring ○					
9	Sealing Ring ○					
10	Oil Valve Kit STD. ■ F3	926496 926581	926497 926582	926498 926583	926498 926583	926498 926583

● Included in STD. bladder assembly.
F3 equivalent bladder assembly.
⊖ Included in valve guard cap kit 926532
○ Included in STD. anti-extrusion ring kit.
F3 equivalent anti-extrusion ring kit.
■ Included in STD. oil valve kit.
F3 equivalent oil valve kit.

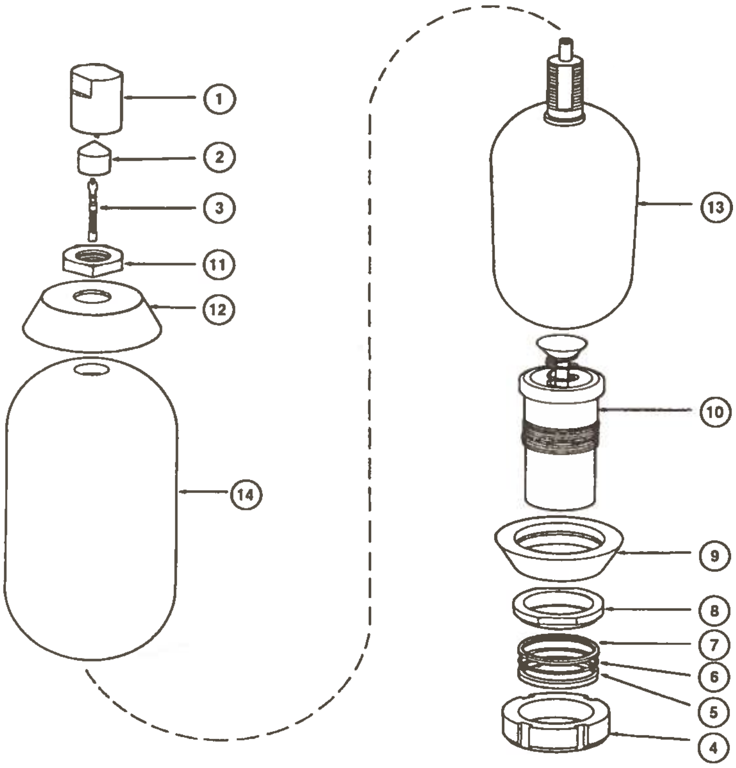


Figure 4. Exploded View

D. CLEANING

Wash all parts, except bladder (13), sealing ring (9), and o-ring (7) with trichloroethylene or a suitable cold cleansing agent. Wash bladder (13) with methylated spirits or water. Dry off parts for inspection.

E. INSPECTION, REPAIR & PART REPLACEMENT

1. Discard rubber seals and obtain a new anti-extrusion ring kit. Refer to Figure 4 for the kit part number.

2. Visually inspect accumulator bladder (13) for holes, cracks, charring, and distortion. Replace the bladder if any of the preceding conditions are evident. If the bladder seems to be in good contition, perform step 3.

3. Check the bladder for leaks as follows:

   a. Screw valve core (3) into bladder.

   b. Inflate the bladder with filtered compressed air to 1.4 times its size.

   c. Apply a soap solution to the entire bladder surface, including the valve core area. Carefully check the bladder surface and valve core area for leaks. *NO LEAKS ARE ALLOWED.* Replace the bladder if a leak is detected.

4. Inspect oil valve (10) for damaged threads, burrs, and rust spots. Remove minor burrs with an India stone. Check the plunger and spring within the oil valve for proper function. Replace the oil valve if damaged threads, rust spots, or improper plunger/spring action are noted.

5. Inspect both shell (14) openings for burrs. Remove minor burrs with an India stone. Use a flashlight to inspect inside of shell. Check for cracks, scratches, or burrs. If condition of shell is questionable, replace the accumulator.

6. Inspect all other parts for wear and/or damage. Replace any part that looks worn or damaged.

F. ASSEMBLY

Assemble the accumulator in reverse item number sequence as shown in Figure 4. Perform the following steps:

1. Attach the valve core tool to the gas valve portion of bladder (13).

2. Wet inside of shell (14) and outer surface of bladder (13) with clean, system fluid.

3. Fold bladder (13) lengthwise and carefully insert it into oil valve opening of shell. Reach into gas valve opening of shell and grip the valve tool with pliers. Pull on the valve core tool until the gas valve portion of bladder protrudes out of gas valve opening of shell.

4. Insert nameplate (12) over the gas valve and onto shell.

5. Apply a small amount of oil to threads of hex nut (11). Screw hex nut (11) onto gas valve portion of bladder, hand tight. Remove the pull rod.

6. Reach into shell and press on the bladder to remove air from inside of bladder. Thread inner valve guard cap (2) onto gas valve portion of bladder while pressing on bladder. This will prevent the bladder from expanding during installation of anti-extrusion assembly (items 10 thru 5).

7. Dip the shoulder end of oil valve (10) and the sealing ring (9) into clean, system fluid. Hold onto threaded portion of oil valve and position the shoulder end of oil valve into shell opening. Next, fold sealing ring (9) and insert it into shell opening behind the oil valve. Push on the oil valve until the sealing ring fits uniformly around the shoulder end of oil valve.

8. Insert retaining ring (8) into shell opening and onto oil valve (10). Center the retaining ring against the sealing ring. Pull the oil valve outwards through the shell opening.

9. Remove inner valve guard cap (2). Install valve core (3) into gas valve portion of bladder with the valve core tool.

10. Fill bladder (13) with compressed air while centering the oil valve and retaining ring at opposite end of accumulator shell.

11. Wrap masking tape around threaded portion of oil valve (10).

12. Install washer (7), o-ring (6), and back-up ring (5) onto oil valve. Push the o-ring and back-up ring uniformly into shell with a blunt screwdriver. Remove the masking tape and apply a small amount of oil to the oil valve threads.

13. Screw slotted nut (4) onto oil valve (10). Tighten the nut securely with a spanner wrench. (Note: Make sure the oil valve does not turn while tightening the slotted nut. Secure the oil valve with a vise or large wrench.)

14. Apply a small amount of oil to pipe (bleeder) plug (4) threads. Screw the plug into oil valve (10).

15. Push on valve core (3) to release air from bladder (13). Remove the valve core to insure all the air is released from bladder. Reinstall the valve core.

16. Install inner valve guard cap (2) over the valve core.

17. Pour a liberal amount of system fluid (approximately 1/10th accumulator content) into oil valve port. Use a funnel for this operation. This step insures the proper lubrication of the bladder and inner shell surface. Roll the accumulator back and forth two or three times. Drain off the fluid. Remove inner valve guard cap (2).

18. Pre-charge the accumulator with nitrogen to approximately 10 PSI. Follow accumulator pre-charge instruction in Section IV. Tighten hex nut (11). Continue to pre-charge the accumulator until the correct pressure for your application is obtained.

19. Apply a soap solution to the valve core area of the accumulator. Check for leaks. *NO LEAKS ARE ALLOWED.* If the accumulator does not accept a pre-charge, refer to the troubleshooting chart (Table 4) for possible repair solutions.

20. Install inner valve guard cap (2) and outer valve guard cap (1).

21. When the accumulator is placed into service, refer to Section III–Installation & Maintenance and the installation drawing for proper instructions.

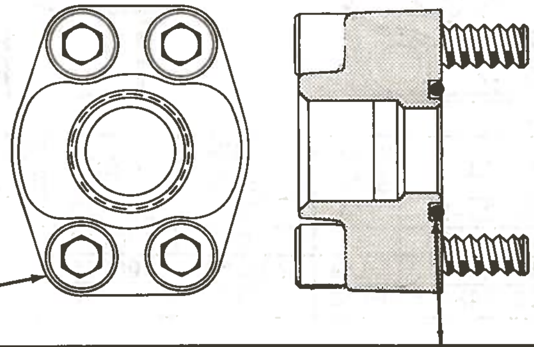
22. Check the pre-charge pressure within a week of initial pre-charge. The pressure should be checked with zero hydraulic pressure on the circuit. Disconnect the accumulator from the circuit by turning off the line valve and opening the valve to the reservoir.

Service Parts Information

VICKERS®
A TRINOVA COMPANY

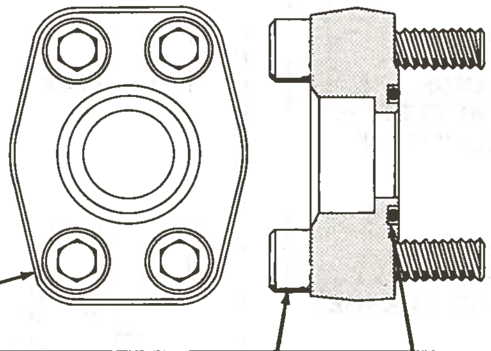
SAE SOLID 4-BOLT FLANGES

PIPE THREAD



MODEL NUMBER	PIPE SIZE	SCREW (4 REQ'D)	"O" RING	MAX. PSI PRESSURE
FL1-6-06P-10	3/4	1074	200139	3000
FL1-8-08P-10	1	1075	200143	
FL1-10-10P-10	1-1/4	298150	200145	
FL1-12-12P-10	1-1/2	1116	151296	
FL1-16-16P-10	2		200149	
FL1-20-20P-10	2-1/2	1117	200152	
FL1-24-24P-10	3	298169	200157	
Ø FL1-24-24P-LP-10		298168		500

SOCKET WELD



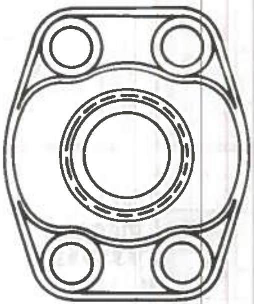
ORDER THE FLANGES BY COMPLETE MODEL NUMBER. SEALS AND SCREWS ARE INCLUDED.

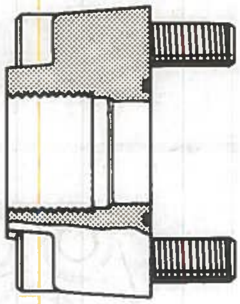
Ø USED ON 45V SERIES INLET ONLY

MODEL NUMBER	PIPE SIZE	SCREW (4 REQ'D)	"O" RING	MAX. PSI PRESSURE
FL1-8-08W-10	1	1075	200143	3000
FL1-10-10W-10	1-1/4	298151	200145	
FL1-12-12W-10	1-1/2	10955	151296	
FL1-16-16W-10	2	1117	200149	
FL1-20-20W-10	2-1/2	298159	200152	
FL1-24-24W-10	3	298171	200157	
Ø FL1-24-24W-LP-10		298170		500
FL1-28-28W-10	3-1/2	298168	200161	
FL1-32-32W-10	4	298169	200165	

STRAIGHT THREAD

FLANGE (NOT SOLD SEPARATELY)

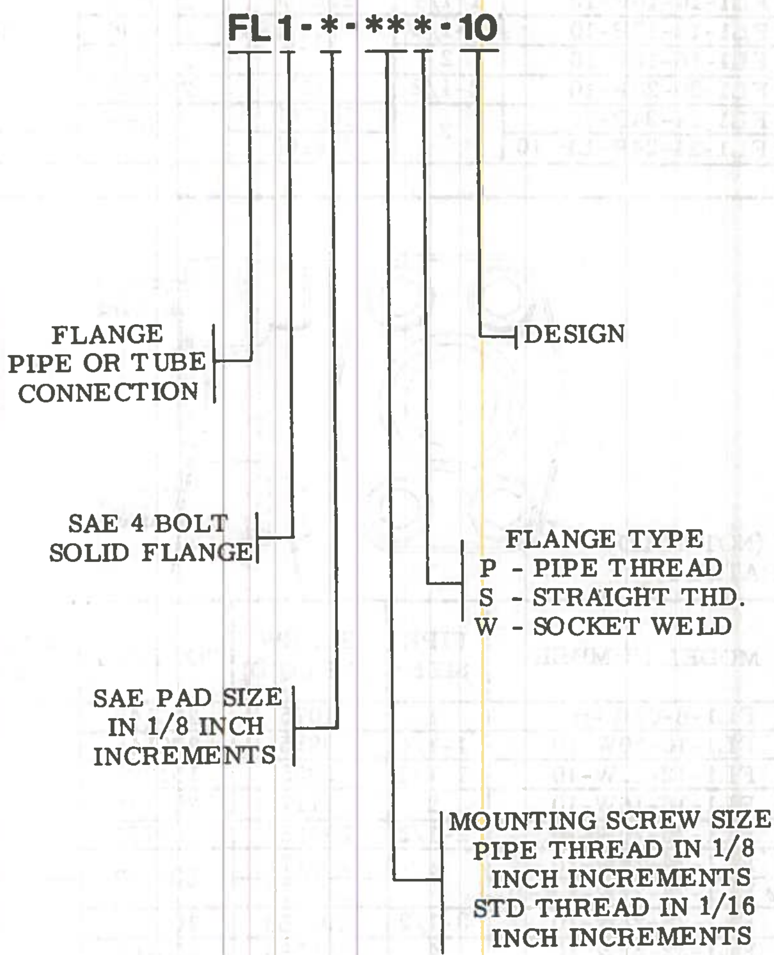




ORDER THE FLANGES BY COMPLETE MODEL NUMBER. SEALS AND SCREWS ARE INCLUDED.

MODEL	PIPE SIZE	SCREW (4 REQ'D)	"O"RING	MAX. PSI PRESSURE
FL1-6-12S-10	3/4	1074	200139	3000
FL1-8-16S-10	1	1075	200143	
FL1-10-20S-10	1-1/4	298150	200145	
FL1-12-24S-10	1-1/2	1116	151296	

MODEL CODE BREAKDOWN



Service Parts Information

VICKERS®
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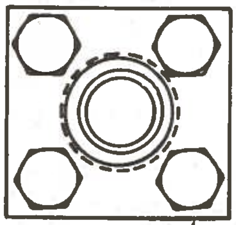
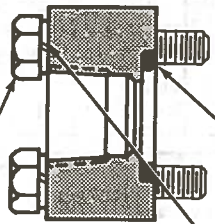
FLANGES AND FLANGE UNIONS

FLANGES

FLANGE WITH THREADED PIPE CONNECTION.
"PS"=STRAIGHT TYPE

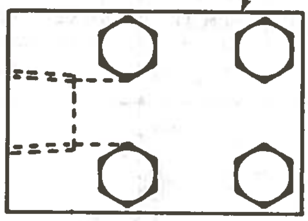


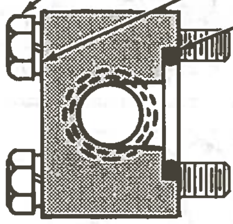


STRAIGHT TYPE

# MODEL NUMBER	PIPE SIZE	FLANGE	SCREW (4 REQ'D)	SCREW (4 REQ'D)	WASHER (4 REQ'D)	"O" RING
FL-10-**-20	1-1/4	NOT SOLD SEPA-RATELY	11163	1329	9X-99786	154026
FL-12-**-20	1-1/2		8876	11171	9X-99788	154082
FL-16-**-20	2					
FL-20-**-20	2-1/2		11181	11183	9X-99790	154090
FL-24-**-20	3					

FLANGE WITH THREAD-ED PIPE CONNECTION.
"PL"=ELL TYPE

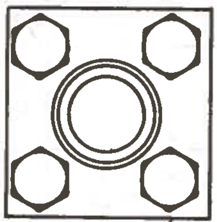


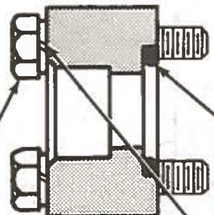


ELL TYPE

NOTE: ORDER BY MODEL CODE. USE "PS" OR "PL" IN PLACE OF ASTERISKS (**).

FLANGE WITH SOCKET WELD PIPE CONNECTION.
"WS"=STRAIGHT TYPE

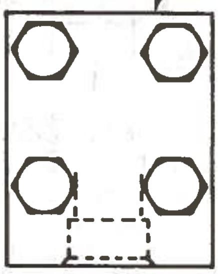


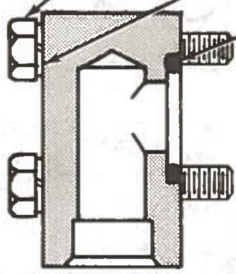


STRAIGHT TYPE

# MODEL NUMBER	PIPE SIZE	FLANGE	SCREW (4 REQ'D)	SCREW (4 REQ'D)	WASHER (4 REQ'D)	"O" RING
FL-10-**-20	1-1/4	NOT SOLD SEPA-RATELY	214710	155971	9X-99786	154026
FL-12-**-20	1-1/2		214769	214774	9X-99788	154082
FL-16-**-20	2					
FL-20-**-20	2-1/2		214828	214835	9X-99790	154090
FL-24-**-20	3					

FLANGE WITH SOCKET WELD PIPE CONNECTION.
"WL"=ELL TYPE



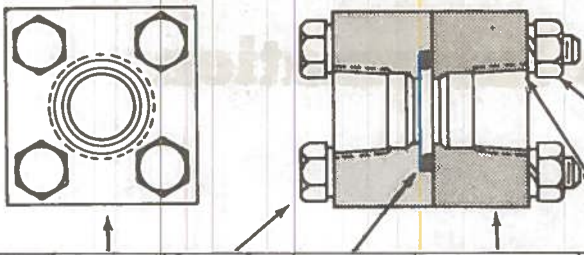


ELL TYPE

NOTE: ORDER BY MODEL CODE. USE "WS" OR "WL" IN PLACE OF ASTERISKS (**).

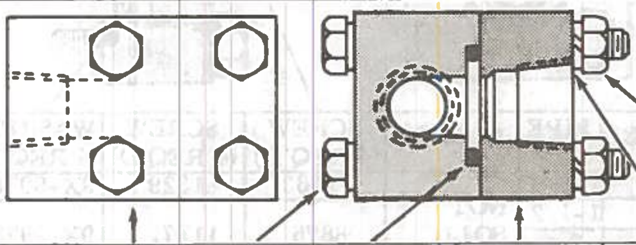
THREADED PIPE CONNECTIONS

STRAIGHT TYPE



# MODEL NUMBER	PIPE SIZE	FLANGE	SCREW (4 REQ'D)	"O" RING	COMPANION FLANGE	WASHER (4 REQ'D)	NUT (4 REQ'D)
FLC-10-PS-20	1-1/4	NOT SOLD SEPA-RATELY	11164	154026	NOT SOLD SEPA-RATELY	9X-99786	1458
FLC-12-PS-20	1-1/2		11171	154082		9X-99788	1462
FLC-16-PS-20	2						
FLC-20-PS-20	2-1/2		11183	154090		9X-99790	1466
FLC-24-PS-20	3						

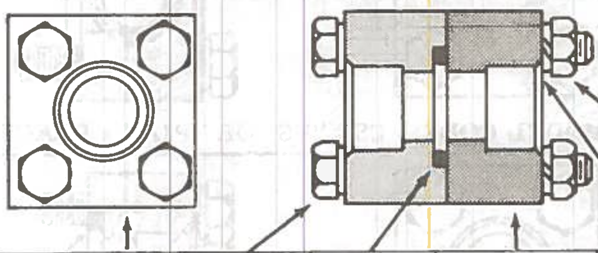
ELL TYPE



# MODEL NUMBER	PIPE SIZE	FLANGE	SCREW (4 REQ'D)	"O" RING	COMPANION FLANGE	WASHER (4 REQ'D)	NUT (4 REQ'D)
FLC-10-PL-20	1-1/4	NOT SOLD SEPA-RATELY	9431	154026	NOT SOLD SEPA-RATELY	9X-99786	1458
FLC-12-PL-20	1-1/2		111823	154082		9X-99788	1462
FLC-16-PL-20	2						
FLC-20-PL-20	2-1/2		130239	154090		9X-99790	1466
FLC-24-PL-20	3						

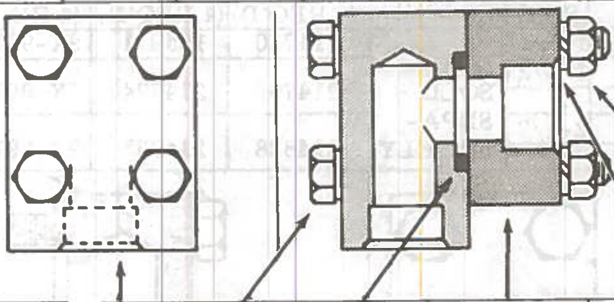
SOCKET WELD PIPE CONNECTIONS

STRAIGHT TYPE



# MODEL NUMBER	PIPE SIZE	FLANGE	SCREW (4 REQ'D)	"O" RING	COMPANION FLANGE	WASHER (4 REQ'D)	NUT (4 REQ'D)
FLC-10-WS-20	1-1/4	NOT SOLD SEPA-RATELY	188403	154026	NOT SOLD SEPA-RATELY	9X-99786	1458
FLC-12-WS-20	1-1/2		214774	154082		9X-99788	1462
FLC-16-WS-20	2						
FLC-20-WS-20	2-1/2		214835	154090		9X-99790	1466
FLC-24-WS-20	3						

ELL TYPE



# MODEL NUMBER	PIPE SIZE	FLANGE	SCREW (4 REQ'D)	"O" RING	COMPANION FLANGE	WASHER (4 REQ'D)	NUT (4 REQ'D)
FLC-10-WL-20	1-1/4	NOT SOLD SEPA-RATELY	214714	154026	NOT SOLD SEPA-RATELY	9X-99786	1458
FLC-12-WL-20	1-1/2		214779	154082		9X-99788	1462
FLC-16-WL-20	2						
FLC-20-WL-20	2-1/2		247942	154090		9X-99790	1466
FLC-24-WL-20	3						

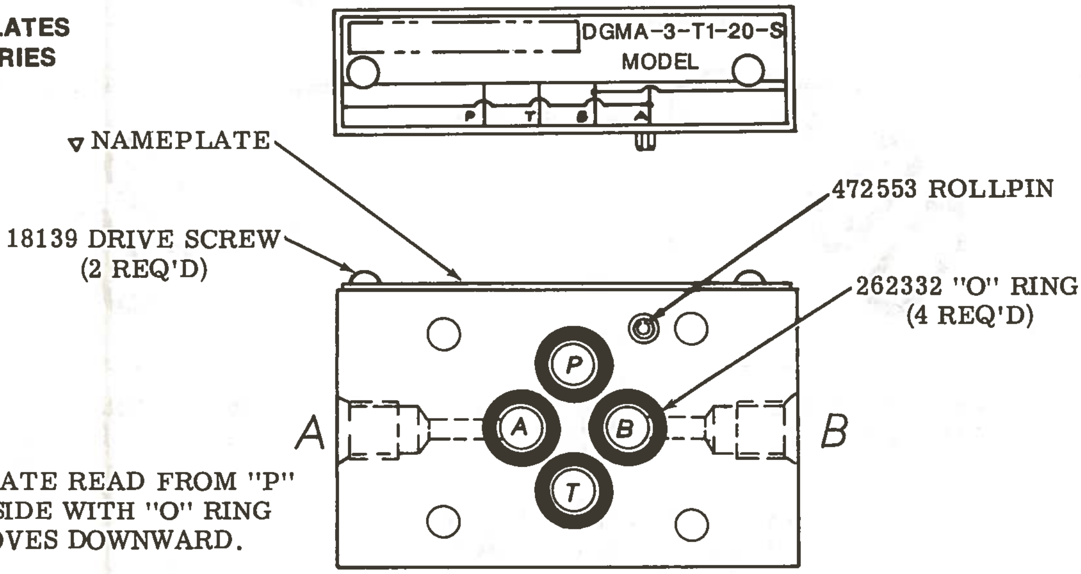
ORDER BY MODEL NUMBER TO GET THE FLANGE AND ALL THE OTHER PARTS LISTED AFTER THE MODEL NUMBER

Service Parts Information

VICKERS®
A TRINOVA COMPANY

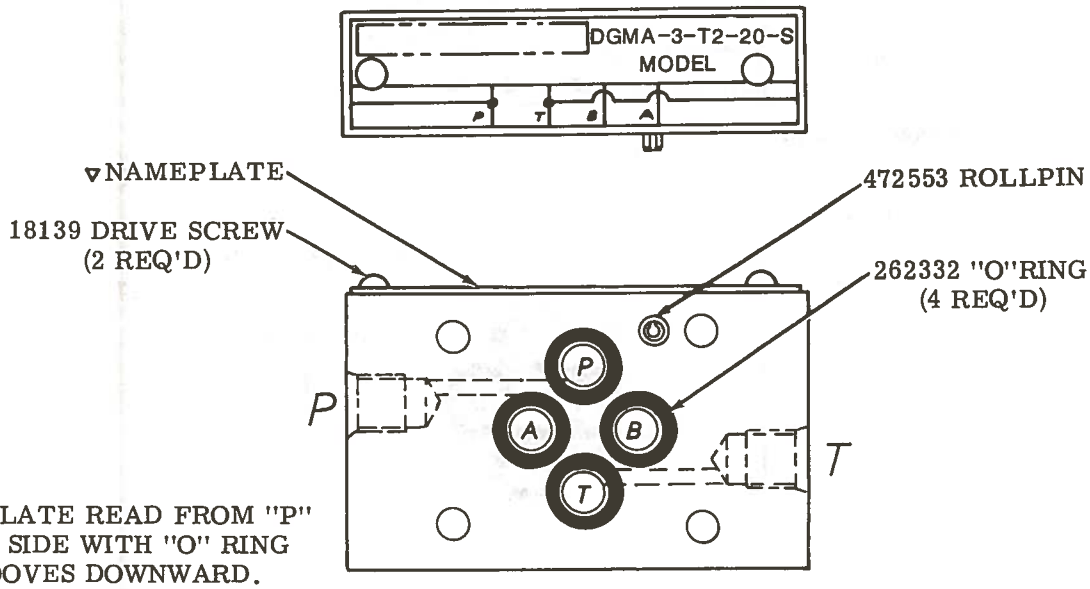
TAPPING PLATES
CROSSOVER PLATES
BLANKING PLATES

TAPPING PLATES
DG4V-3 SERIES



▽NAMEPLATE READ FROM "P" PORT SIDE WITH "O" RING GROOVES DOWNWARD.

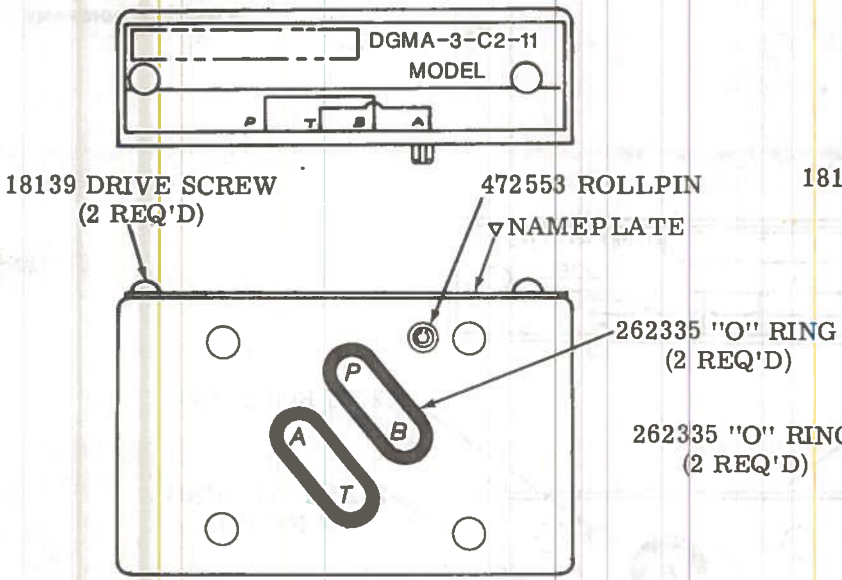
TAPPING PLATE, A & B PORTS
WITH SAE CONNECTIONS



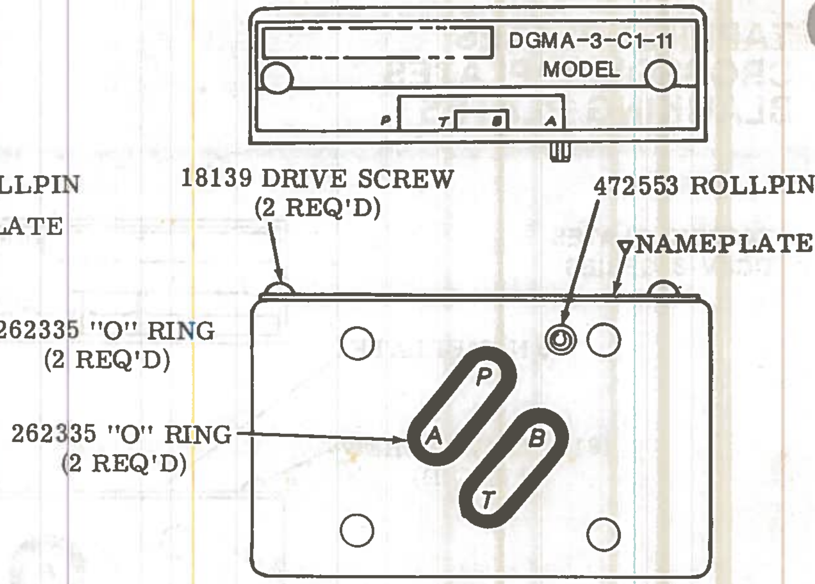
▽NAMEPLATE READ FROM "P" PORT SIDE WITH "O" RING GROOVES DOWNWARD.

TAPPING PLATE, P & T PORTS
WITH SAE CONNECTIONS

CROSSOVER PLATE
DG4V-3 SERIES



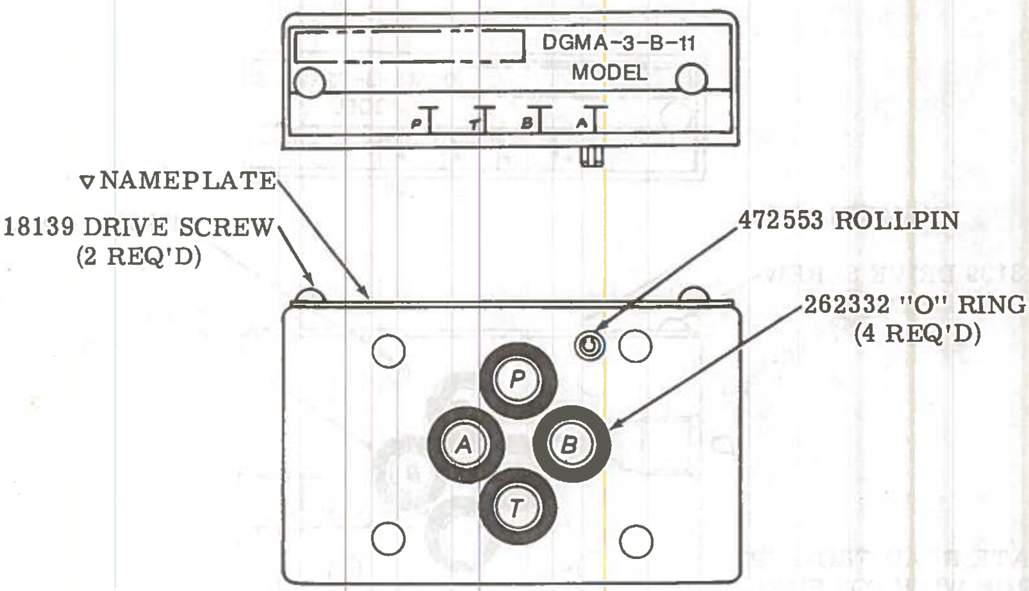
CROSSOVER PLATE
A TO T & B TO P



CROSSOVER PLATE
A TO P & B TO T

▽ NAMEPLATE READ FROM "P" PORT SIDE
WITH "O" RING GROOVES DOWNWARD.

BLANKING PLATE
DG4V-3 SERIES



BLANKING PLATE

▽NAMEPLATE READ FROM "P" PORT SIDE
WITH "O" RING GROOVES DOWNWARD.

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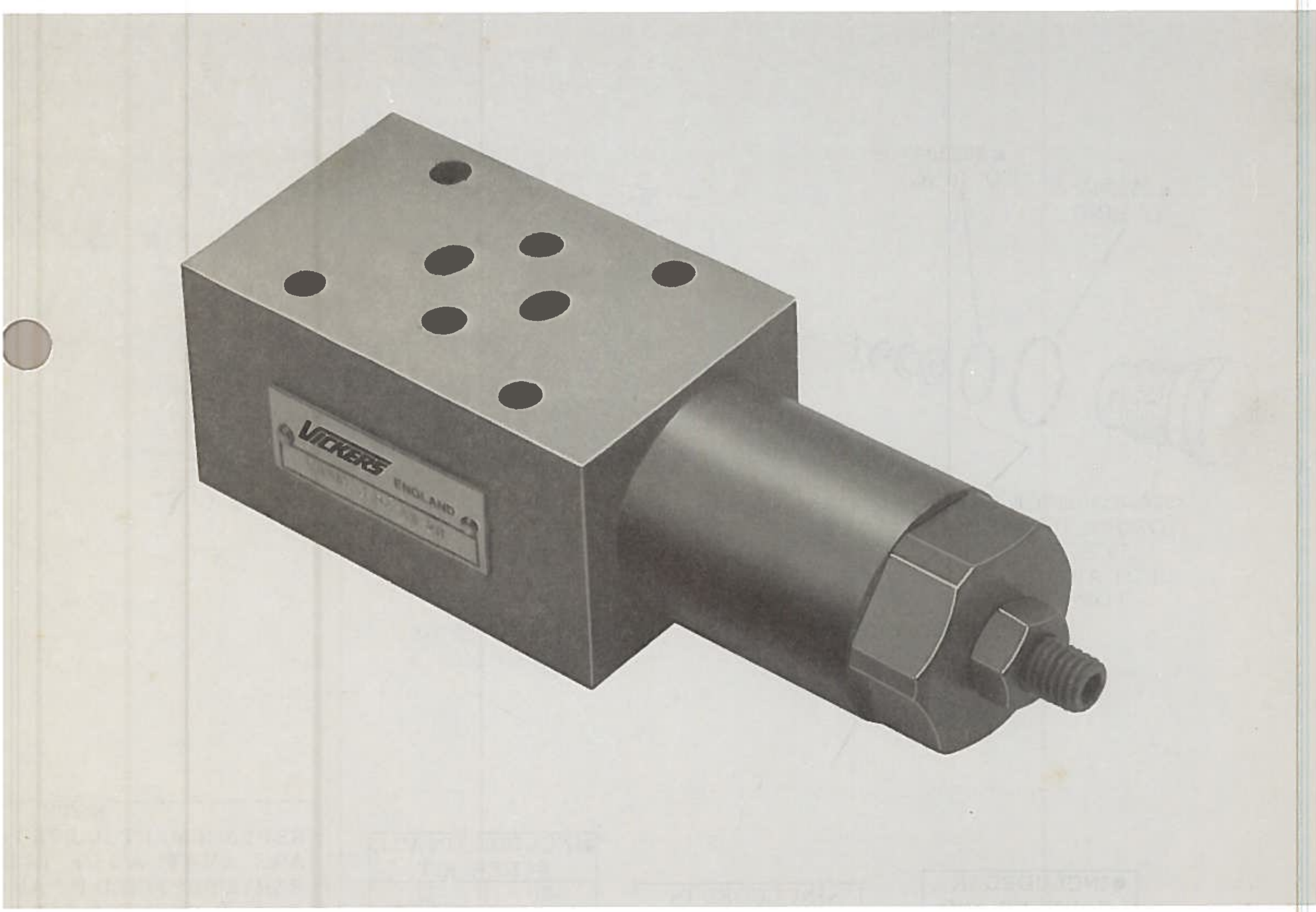
Service Parts Information

Pressure Reducing Module

DGMX1-3-P*-*W-20



Vickers, Incorporated

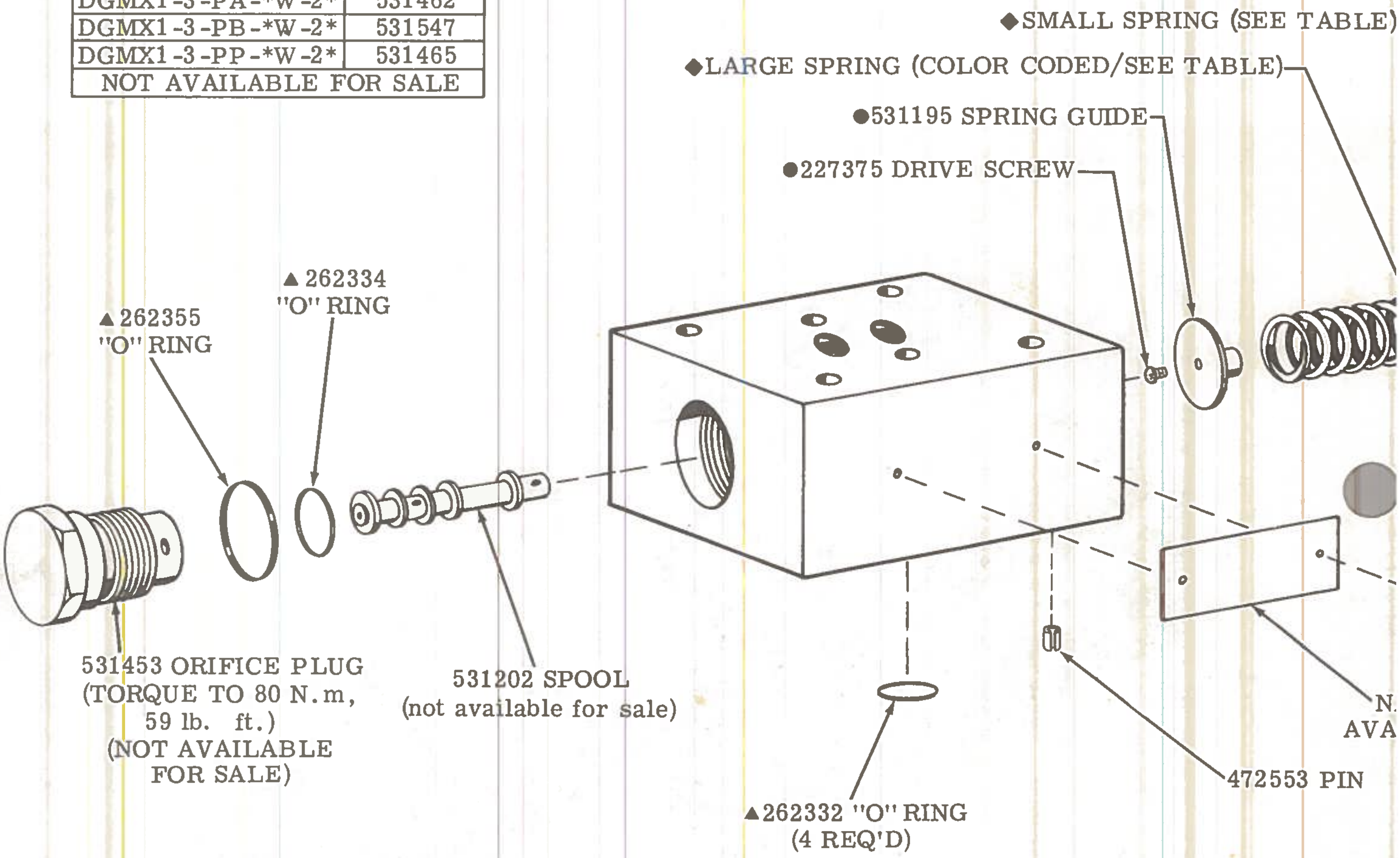
1401 Crooks Road
Troy, Michigan 48084

Revised 9-1-85

I-3391-S

MODEL	SPRING TYPE	LARGE SPRING	SMALL SPRING	PRESSURE RANGE		COLOR CODE
				bar	PSI	
DGMX1-3-P*-AW-2*	A	531150	———	3.5 TO 30	50 TO 425	———
DGMX1-3-P*-BW-2*	B	531203		15.0 TO 70	225 TO 1000	BLUE
DGMX1-3-P*-CW-2*	C	531204	531275	15.0 TO 140	225 TO 2000	GREEN
DGMX1-3-P*-FW-2*	F	531206	531205	15.0 TO 250	225 TO 3600	———

MODEL	BODY S/A
DGMX1-3-PA-*W-2*	531462
DGMX1-3-PB-*W-2*	531547
DGMX1-3-PP-*W-2*	531465
NOT AVAILABLE FOR SALE	



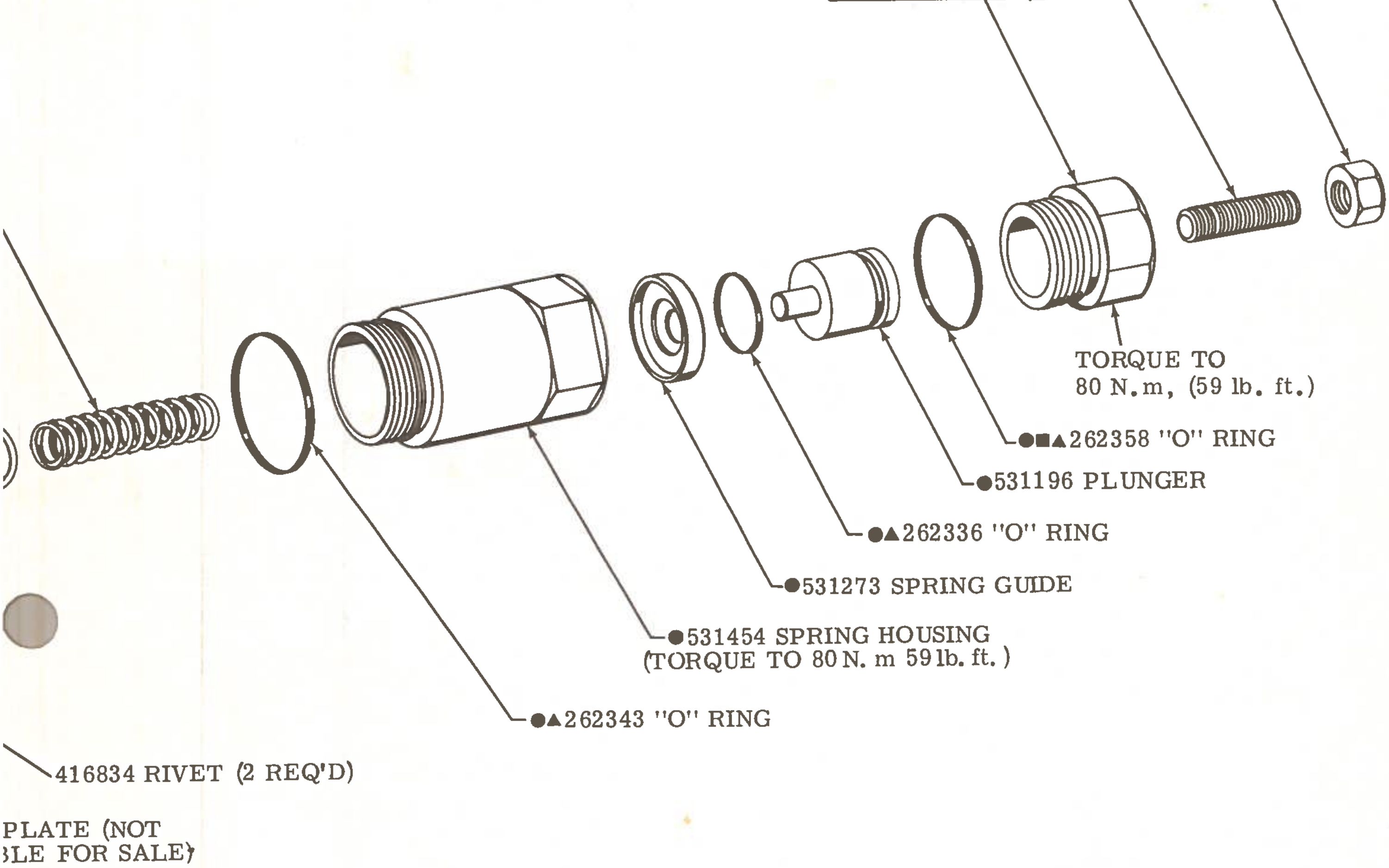
●INCLUDED IN PLUNGER AND GUIDE KIT 942449

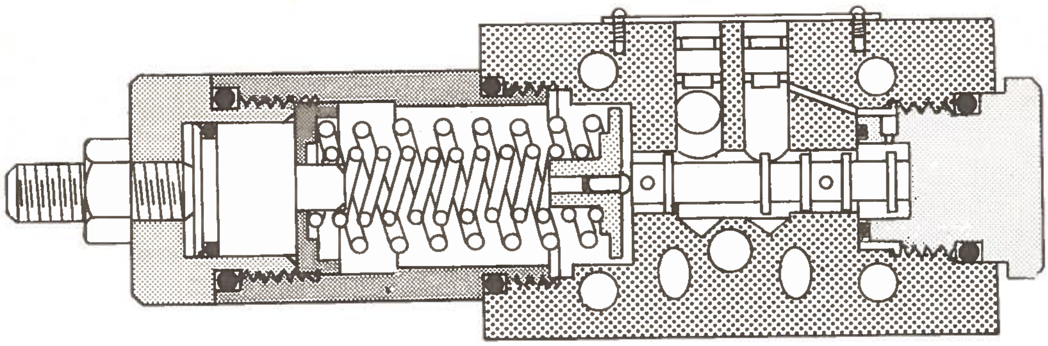
▲INCLUDED IN SEAL KIT 920085

■INCLUDED IN ADJ. SCREW KIT	
-20	-21
942448	941365

NOTE
REPLACEMENT PARTS FO
ARE AVAILABLE IN S
PARTS PREFIXED BY AN
TAINED INDIVIDUALLY.

DESIGN	■PLUG	◆■SETSCREW	◆■NUT
-20	531192	471151	531541
-21	531611	530601	530532





HIS UNIT
ICE KITS.
N BE OB-

MODEL CODE BREAKDOWN

DGM X1 - 3 - P* - *W - 2*

- **DGM** — MODULAR VALVE
- **X1** — TYPE OF MODULE: REDUCING (VENT TYPE SPOOL)
- **3** — INTERFACE: CETOP-3 & NFPA-D 01
- **P** — PORT OPERATED UPON: P PORT
- ***** — CONTROL PORT:
  - A PORT
  - B PORT
  - P PORT
- ***** — PRESSURE RANGE:

A -	3.5 TO 30 bar.	(50 - 425 PSI)
B -	15.0 TO 70 bar.	(225 - 1000 PSI)
C -	15.0 TO 140 bar.	(225 - 2000 PSI)
F -	15.0 TO 250 bar.	(225 - 3600 PSI)

- **W** — ADJUSTMENT MECHANISM: STANDARD HEX SCREW AND LOCK NUT
- **2*** — DESIGN NUMBER:
  - -20
  - -21

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

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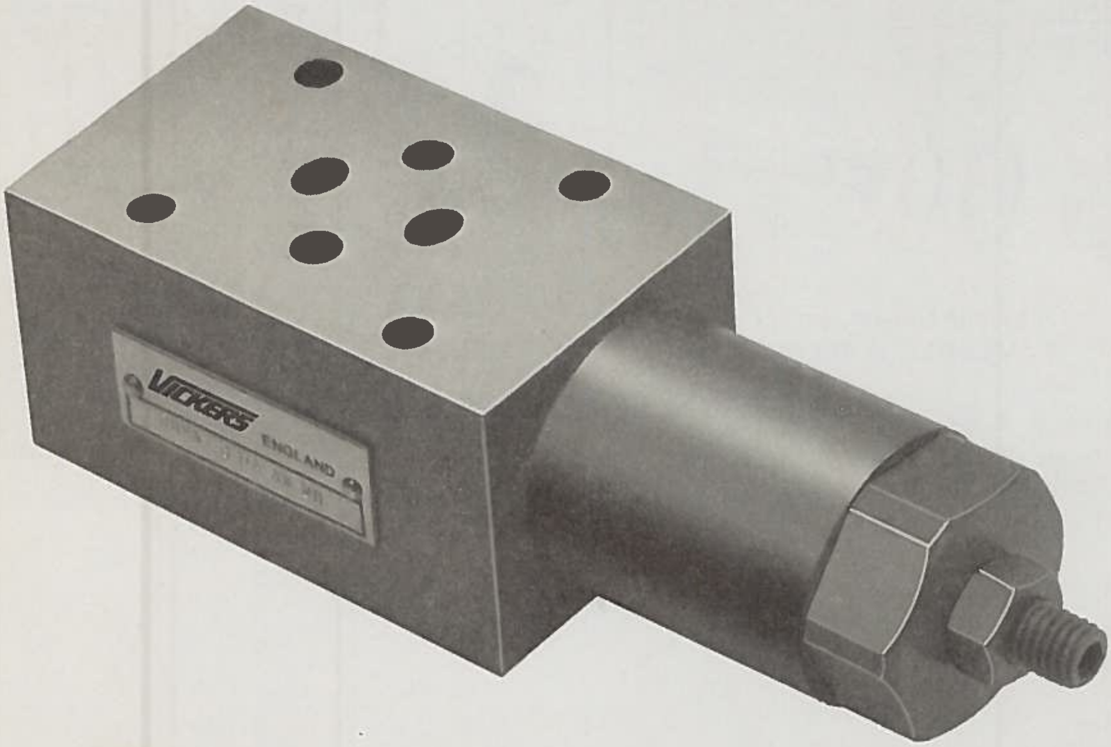
Service Parts Information

Counter Balance And Sequence Modules

DGMR-3-TA-*W-20
DGMR1-3-PP-*W-20



Vickers, Incorporated
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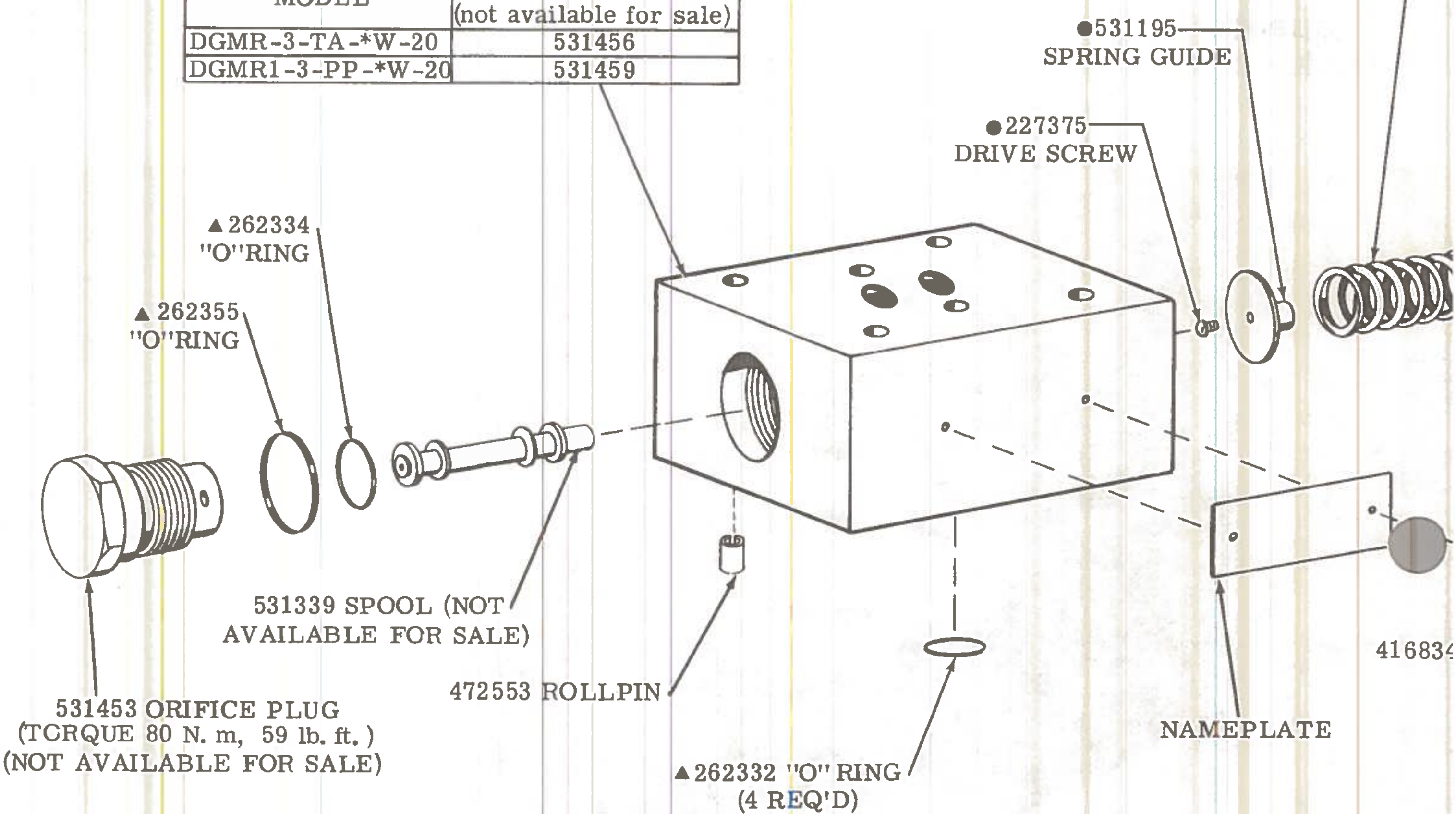
Revised 9-1-85

I-3390-S

MODEL	SPRING TYPE	◆LARGE SPRING	◆SMALL SPRING	PRESSURE RANGE IN BARS	COLOR CODE
DGMR*-3-**-AW-20	A	531150	———	3.5 TO 30 (50 TO 425 PSI)	———
DGMR*-3-**-BW-20	B	531203		20.0 TO 70 (300 TO 1000 PSI)	BLUE
DGMR*-3-**-CW-20	C	531204**	531275	50.0 TO 140 (725 TO 2000 PSI)	**GREEN
DGMR*-3-**-FW-20	F	531206	531205	100.0 TO 250 (1450 TO 3600 PSI)	———

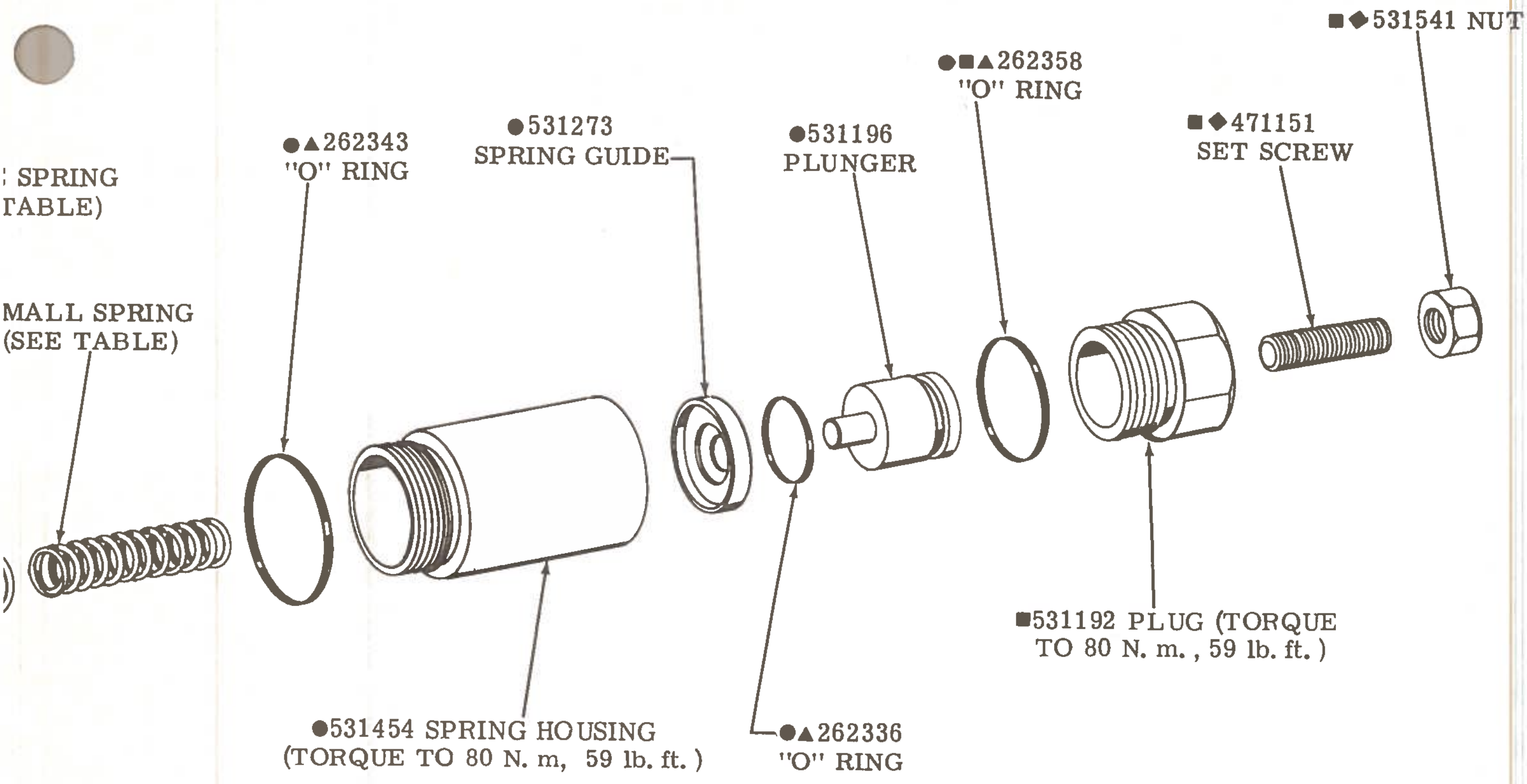
MODEL	BODY SUBASSEMBLY (not available for sale)
DGMR-3-TA-*W-20	531456
DGMR1-3-PP-*W-20	531459



▲SERVICE ALL UNITS W/F3 SEAL KIT 920085

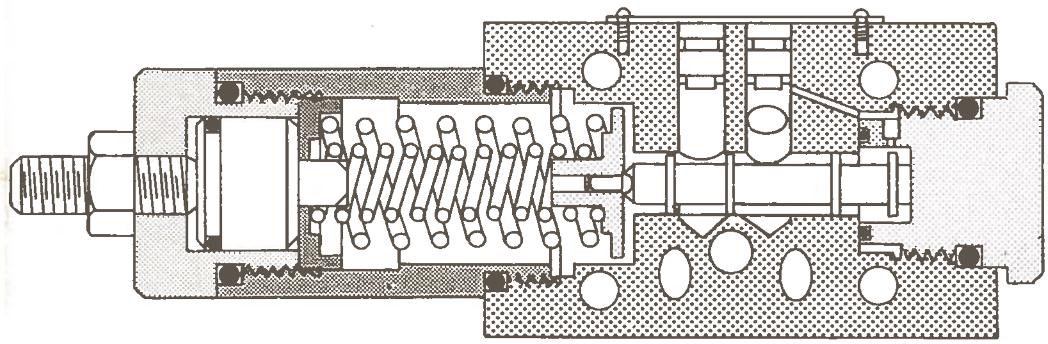
■ INCLUDED IN ADJUSTMENT SCREW KIT 942448

●INCLUDED IN PLUNGER AND GUIDE KIT 942449



ET (2 REQ'D)

NOTE
REPLACEMENT PARTS FOR THIS UNIT ARE AVAILABLE IN SERVICE KITS. PARTS PREFIXED BY AN ◆ CAN BE OBTAINED INDIVIDUALLY. BODIES ARE NOT AVAILABLE FOR SALE.



MODEL CODE BREAKDOWN

DGM R(*)-3--*W-20**

- **DGM** — MODULAR VALVE
- **R(*)** — TYPE OF MODULE
  - R - BACK PRESSURE
  - R1 - SEQUENCE (VENT TYPE SPOOL)
- **3** — INTERFACE CETOP-3 & (NFPA-D 01)
- ***** — PORT OPERATED UPON
  - P PORT - SEQUENCE
  - T PORT - BACK PRESSURE
- ***** — CONTROL PORT
  - P PORT - SEQUENCE
  - A PORT - BACK PRESSURE
- ***** — PRESSURE RANGE
  - A - 3.5 TO 30 bar (50 - 425 PSI)
  - B - 20.0 TO 70 bar (300 - 1000 PSI)
  - C - 50.0 TO 140 bar (725 - 2000 PSI)
  - F - 100.0 TO 250 bar (1450 - 3600 PSI)
- **W** — ADJUSTMENT MECHANISM STANDARD HEX SCREW AND LOCK NUT
- **20** — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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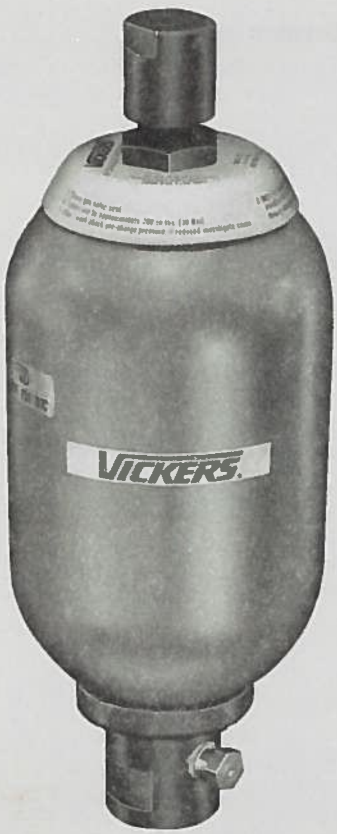
Service Parts Information

Bladder Type Accumulators

(F3) A1-75-30
(F3) A1-200-30
(F3) A1-550-30
(F3) A1-1050-30
(F3) A1-2050-30



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Revised 3-1-90 I-3986-S

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SECTION I – INTRODUCTION

A. PURPOSE OF MANUAL

This manual provides operating instructions and overhaul information for Vickers -30 design bladder type accumulators. Information contained herein pertains to the latest design series as listed in Table 1.

Model	Assembly No.
A1-75-30	633100
A1-200-30	633101
A1-550-30	633102
A1-1050-30	633103
A1-2050-30	633104

Table 1. Model Series

B. RELATED PUBLICATIONS

Service part information is included in this manual. Installation and performance specifications are not covered in this manual. Overall dimensions and performance data are shown on installation drawing 521801. The installation drawing is available from any Vickers sales engineering office or from:

Vickers, Incorporated
Technical Publications
1401 Crooks Road
Troy, Michigan 48084

C. MODEL CODE

Variations within each model series are described in the model code. The model code is stamped on the accumulator nameplate. See Table 2.

F3	A1 –	* * * *			-30
Seals for Mineral Oil and Fire Resistant Fluids	Accumulator Bladder Type	Nominal Size	(Gas Capacity - in.^{3})	(Fluid Capacity - Gal.)	Design
		75	61	¼	
		200	213.6	1	
		550	579.7	2.5	
		1050	1067.9	5	
		2050	2044.2	10	

Table 2. Model Code

Section II – DESCRIPTION

A. GENERAL DESCRIPTION

Vickers industrial type accumulators are made of seamless steel alloy that is shaped into a cylindrical form having spherical ends. Each accumulator contains a Buna type rubber bladder. The bladder is precharged through the valve core with nitrogen gas. The opposite end of the accumulator contains an oil valve which connects into the hydraulic circuit. The oil valve has an SAE straight thread connection. The bladder is protected from wear at the oil valve end by a rubber sealing ring. This sealing ring helps prevent scuffing of the bladder during operation. The shell interior has a 500 micro finish that increases bladder life. Figure 1 is a typical cross sectional view of a -30 design bladder type accumulator.

B. OPERATION

Operation of the accumulator is automatic. A combination of oil, which is virtually non-compressible, and nitrogen, which can both expand and compress, make the accumulator work. As oil is pumped into the accumulator, it forces the gas to compress until resistance of the gas equals the oil pressure. When the hydraulic system needs oil, the compressed gas forces oil from the accumulator to maintain system flow.

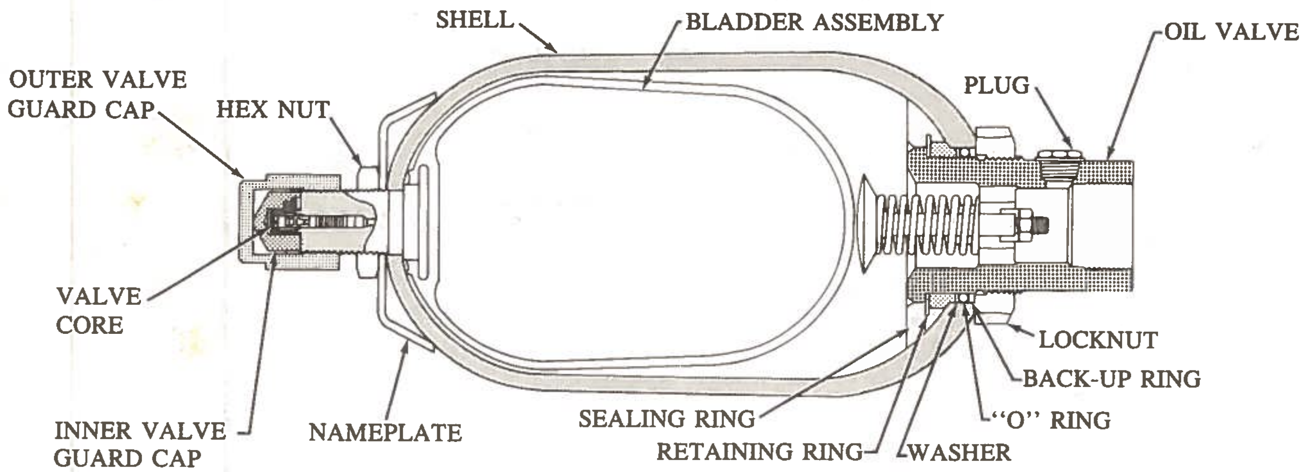


Figure 1. Sectional View

Section III – INSTALLATION & MAINTENANCE

A. INSTALLATION

All accumulators have female connections. If it is necessary to adapt to smaller fittings, forged steel reducer bushings should be used. Vertical mounting of the accumulator is recommended, but horizontal mounting is permissible. A1-75-30 and A1-200-30 accumulators may be mounted in a line unsupported, providing the line can support the charged accumulator and is free from excessive vibration. Supports should be provided whenever possible. Large size accumulators *must* be supported.

NOTE
Before an accumulator is installed in a hydraulic circuit, it should be inspected, supplied with lubrication oil, and pre-charged with nitrogen gas. Refer to Section IV for the accumulator precharge procedure.

CAUTION
NEVER USE OXYGEN GAS IN AN ACCUMULATOR.

NOTE
When the accumulator is installed in a hydraulic circuit, make sure the accumulator lock nuts and the bleeder plug are tight.

B. PLACING ACCUMULATOR IN SERVICE

After a hydraulic circuit has been opened by alterations to the circuit, the circuit should be purged of air. This is accomplished by purging the circuit at its highest point while intermittently operating its components. If purging is desired in the area of the accumulator, it may be accomplished through the optional bleeder plug located on the side of the oil valve. A ¼ NPTF plug is standard.

CAUTION
DO NOT REMOVE THE BLEEDER PLUG (4) FROM THE ACCUMULATOR. Caution must be used when loosening the bleeder plug, as the oil is under high pressure. Use the bleeder plug to remove extrained air from the accumulator portion of the circuit.

C. PRODUCT LIFE

The service life of this product is dependent upon environment, duty cycle, operating parameters and system cleanliness. Since these parameters vary from application to application, the user must determine and establish the periodic maintenance required to maximize life and detect potential component failure.

Section IV – PRECHARGING PROCEDURE

Precharge the accumulator with nitrogen gas as follows:

1. Remove the outer and inner valve guard cap from the gas valve.

2. Attach a charging hose assembly directly from the nitrogen bottle to the accumulator. Turn the 'T' bar handle inward to depress the valve core of the bladder. The bleeder valve below the pressure gauge MUST BE CLOSED. See Figure 2 for charging hose connections. Refer to Table 3 for the appropriate accumulator charging and gauge assemblies.

Model	Ass'y.	Nomenclature
ACGH-0-L-10	579309	No gauge - L.H. female thd.
ACGH-1500-L-10	179442	1500 PSI liquid filled gauge, L.H. female thd.
ACGH-3000-L-10	179443	3000 PSI liquid filled gauge, L.H. female thd.
ACGH-O-R-10	579310	No gauge - R.H. male thd.
ACGH-1500-R-10	579311	1500 PSI liquid filled gauge, R.H. male thd.
ACGH-3000-R-10	579312	3000 PSI liquid filled gauge, R.H. male thd.

Table 3. Accumulator Charging & Gauging Assemblies

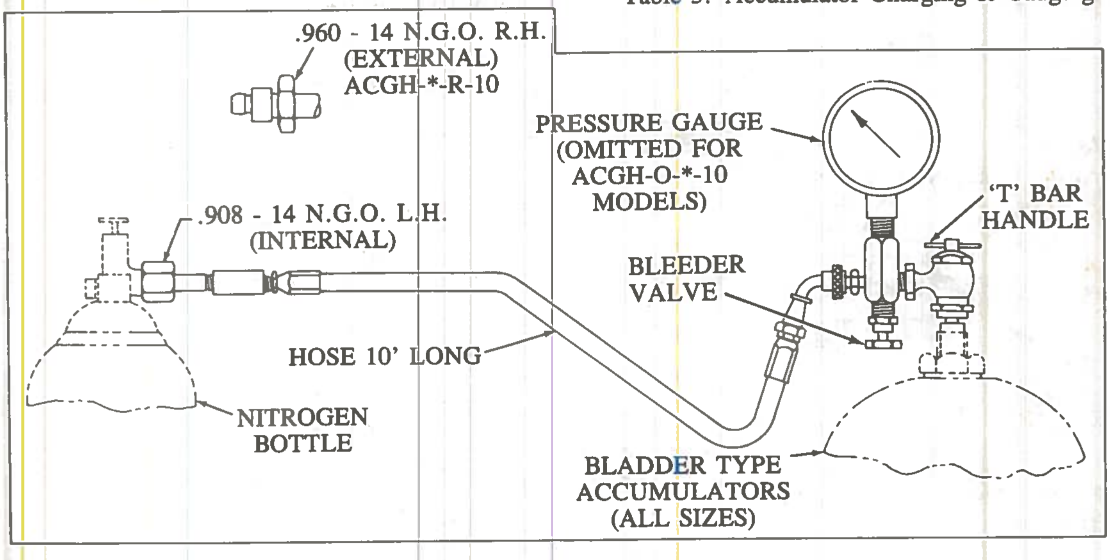


Figure 2. Accumulator Charging & Gauging Device.

3. Open the valve on the nitrogen bottle slowly allowing nitrogen to flow to the accumulator. Intermittently close the valve to allow the accumulator gauge to settle. Precharge pressure will vary with each application, but must not be less than one quarter (¼) or preferably one third (⅓) of the maximum working pressure.

If an accumulator is to be used for absorbing pump pulsations or line shocks, it should be precharged to 60 percent of the mean line pressure and installed as near the source of shock as possible.

4. When the required pressure is reached, maintain for two minutes then read the gauge again. As the nitrogen equalizes in the accumulator, a slight pressure drop will be observed. Slowly open the charging valve again and bring pressure up to the desired reading.

5. Close valve on the nitrogen bottle securely. Turn the "T" bar handle at the accumulator outward to release the valve core. Open the bleeder valve, then remove the charging hose assembly.

6. Carefully test accumulator gas connection for leakage by pouring system fluid in and around the valve core area. Tighten any loose connections. If the core leaks, depress and release the core rapidly to reseat the valve core. No leakage can be tolerated in this area. Replace the core if leakage cannot be stopped.

7. Install a shut-off valve between the accumulator oil port and the main line. Action of the accumulator on the hydraulic circuit can be stopped by means of this valve. Another shut-off valve should be installed between the accumulator and the reservoir. These valves provide a means of isolating and draining the accumulator in the event that servicing is required.

8. Install the accumulator in an accessible location for ease of maintenance.

9. Install a check valve between the pump and accumulator to prevent pump reversal. Other valves may be installed between the check valve and the pump for unloading after maximum circuit pressure is attained.

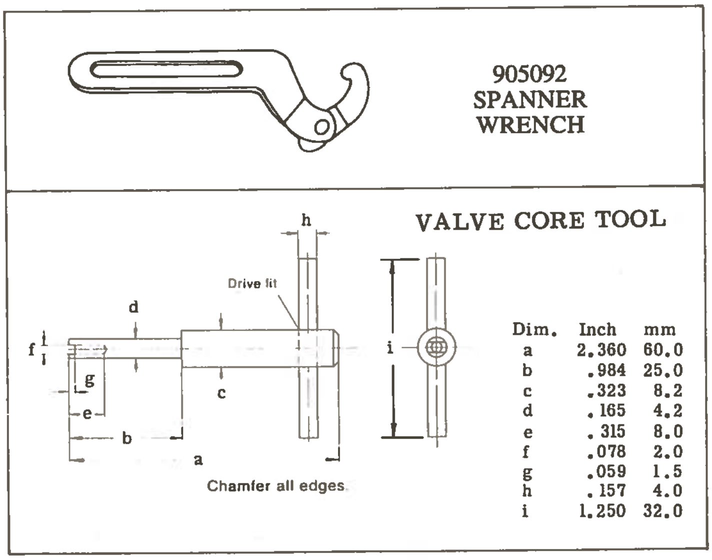
10. *DO NOT* weld supports to the accumulator shell.

Section V – OVERHAUL

A. SERVICE TOOLS

The following list of service tools are required to overhaul a Vickers bladder type accumulator. Special service tools are shown in Figure 3.

1. 10″ adjustable wrench
2. A small, thin blade screwdriver
3. A medium size screwdriver
4. Compressed air
5. Cleaning solvent (methylated spirits or water)
6. Soap solution with brush applicator
7. Heavy duty vise with padded jaws (use on smaller accumulators)
8. Chain vise (use on larger accumulators)
9. A clean, sturdy work bench
10. Spanner wrench (see Figure 3)
11. Valve core tool (see Figure 3)
12. Clean, system fluid
13. Safety glasses
14. A medium size funnel
15. Nitrogen gas
16. Accumulator charging devise (see Figure 2 and Table 3)
17. Flashlight



Dim.	Inch	mm
a	2.360	60.0
b	.984	25.0
c	.323	8.2
d	.165	4.2
e	.315	8.0
f	.078	2.0
g	.059	1.5
h	.157	4.0
i	1.250	32.0

Figure 3. Special Service Tools

B. TROUBLESHOOTING GUIDE

CAUTION
Make sure the accumulator is not subject to hydraulic pressure before removing it from the circuit.

The following chart (Table 4) provides types of accumulator problems, probable causes, and repair solutions. In most cases, accumulator overhaul requires the replacement of the bladder and anti-extrusion ring assembly. Note that improper operating conditions may cause accumulator failure. If this is the case, make sure that the operating conditions are corrected before placing the accumulator into service.

TYPE OF PROBLEM	PROBABLE CAUSE	REPAIR SOLUTION
External Leakage:		
1. Gas valve leaks.	Damaged or broken gas valve core.	Replace valve core or bladder.
2. Gas valve leaks.	Loose connection at accumulator gas valve.	Tighten connection.
3. Oil valve leaks.	Damaged or missing seals.	Replace with new anti-extrusion ring kit.
4. Oil valve leaks.	Loose connection, damaged threads, improper oil valve function.	Tighten connection or replace oil valve.
Internal Leakage:		
1. Bladder leaks at vulcanized seam.	Foreign material introduced into bladder Manufacturing or material fault.	Replace bladder. Check system for cleanliness.
2. Bladder is charred, brittle, or porous.	Working pressure ratio too high causing excessive nitrogen and oil temperature.	Replace bladder. Check working pressure parameters.
3. Cracks at center portion of bladder.	Material fatigue.	Replace bladder.
4. Hole in bladder.	Damaged at assembly, or charge pressure too low causing hole in bladder.	Replace bladder. Check accumulator charge pressure.

Table 4. Troubleshooting Guide

C. DISASSEMBLY

Disassemble the accumulator by item sequence number as shown in Figure 4. Place accumulator parts on a clean surface for inspection.

CAUTION
WEAR SAFETY GLASSES TO PREVENT POSSIBLE EYE INJURY.

1. For smaller size accumulators, clamp the oil valve (10) portion of the accumulator in a heavy duty vise. Protect the oil valve by inserting two flat pieces of steel between the oil valve and the vise jaws. For larger size accumulators, secure the accumulator in a chain vise.

2. Remove outer and inner valve guard cap (1 & 2) to expose core (3).

3. Press on valve core (3) to release gas from the accumulator bladder.

4. Remove valve core (3) with the valve core tool shown in Figure 3.

5. Loosen hex nut (11).

6. Remove slotted nut (4) with a spanner wrench.

7. Remove accumulator from vise and secure on a clean, sturdy work bench.

8. Remove and discard back-up ring (5), o-ring (6), and washer (7) from oil valve (10). Use a thin bladed screwdriver.

9. Push oil valve (10) into accumulator shell (14) until retaining ring (8) and sealing ring (9) are exposed.

10. Reach into shell and align the two flat surfaces of retaining ring (8) with shell opening. Remove retaining ring from shell.

11. Reach into shell and remove sealing ring (9) from shell. Bend or compress the sealing ring to facilitate removal.

12. Remove oil valve (10) from shell (14).

13. Remove hex nut (11) and nameplate (12).

14. Reach into shell opening and remove bladder (13). Slightly fold and twist the bladder for easier removal. If the bladder is very slippery, hold onto bladder with a clean rag.

Item No.	Part Name	Part Numbers				
		Model A1-75-30 (1 Quart)	Model A1-200-30 (1 Gallon)	Model A1-550-30 (2.5 Gallon)	Model A1-1050-30 (5 Gallon)	Model A1-2050-30 (10 Gallon)
1	Outer Valve Guard Cap ⊖ ●	682428	682428	682428	682428	682428
2	Inner Valve Guard Cap ⊖ ●	682427	682427	682427	682427	682427
3	Valve Core ●	682450	682450	682450	682450	682450
11	Hex Nut ●	682426	682426	682426	682426	682426
12	Nameplate	682415	633106	633107	633107	633107
13	Bladder Assembly STD. ● F3	926380 926573	926381 926574	926382 926575	926383 926576	926384 926577
14	Shell (Not for sale)	—	—	—	—	—
4	Slotted Nut O	O(STD.) 926385 (F3) 926578	O(STD.) 926386 (F3) 926579	O(STD.) 926387 (F3) 926580	O(STD.) 926387 (F3) 926580	O(STD.) 926387 (F3) 926580
5	Backup Ring O					
6	"O" Ring ■ O					
7	Washer O					
8	Retaining Ring O					
9	Sealing Ring O					
10	Oil Valve Kit STD. ■ F3	926496 926581	926497 926582	926498 926583	926498 926583	926498 926583

● Included in STD. bladder assembly.
F3 equivalent bladder assembly.
⊖ Included in valve guard cap kit 926532
O Included in STD. anti-extrusion ring kit.
F3 equivalent anti-extrusion ring kit.
■ Included in STD. oil valve kit.
F3 equivalent oil valve kit.

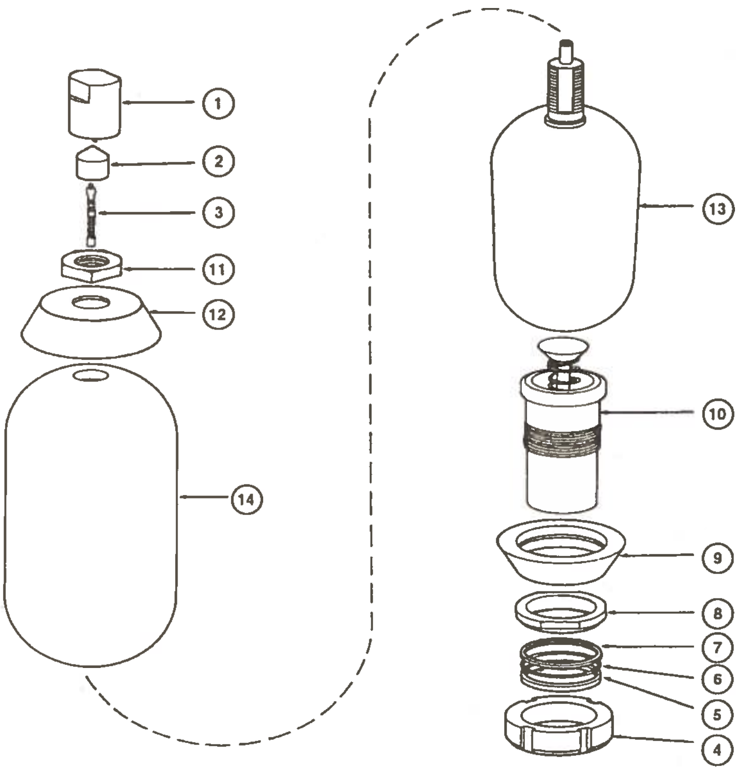


Figure 4. Exploded View

D. CLEANING

Wash all parts, except bladder (13), sealing ring (9), and o-ring (7) with trichloroethylene or a suitable cold cleansing agent. Wash bladder (13) with methylated spirits or water. Dry off parts for inspection.

E. INSPECTION, REPAIR & PART REPLACEMENT

1. Discard rubber seals and obtain a new anti-extrusion ring kit. Refer to Figure 4 for the kit part number.

2. Visually inspect accumulator bladder (13) for holes, cracks, charring, and distortion. Replace the bladder if any of the preceding conditions are evident. If the bladder seems to be in good contition, perform step 3.

3. Check the bladder for leaks as follows:

   a. Screw valve core (3) into bladder.

   b. Inflate the bladder with filtered compressed air to 1.4 times its size.

   c. Apply a soap solution to the entire bladder surface, including the valve core area. Carefully check the bladder surface and valve core area for leaks. *NO LEAKS ARE ALLOWED.* Replace the bladder if a leak is detected.

4. Inspect oil valve (10) for damaged threads, burrs, and rust spots. Remove minor burrs with an India stone. Check the plunger and spring within the oil valve for proper function. Replace the oil valve if damaged threads, rust spots, or improper plunger/spring action are noted.

5. Inspect both shell (14) openings for burrs. Remove minor burrs with an India stone. Use a flashlight to inspect inside of shell. Check for cracks, scratches, or burrs. If condition of shell is questionable, replace the accumulator.

6. Inspect all other parts for wear and/or damage. Replace any part that looks worn or damaged.

F. ASSEMBLY

Assemble the accumulator in reverse item number sequence as shown in Figure 4. Perform the following steps:

1. Attach the valve core tool to the gas valve portion of bladder (13).

2. Wet inside of shell (14) and outer surface of bladder (13) with clean, system fluid.

3. Fold bladder (13) lengthwise and carefully insert it into oil valve opening of shell. Reach into gas valve opening of shell and grip the valve tool with pliers. Pull on the valve core tool until the gas valve portion of bladder protrudes out of gas valve opening of shell.

4. Insert nameplate (12) over the gas valve and onto shell.

5. Apply a small amount of oil to threads of hex nut (11). Screw hex nut (11) onto gas valve portion of bladder, hand tight. Remove the pull rod.

6. Reach into shell and press on the bladder to remove air from inside of bladder. Thread inner valve guard cap (2) onto gas valve portion of bladder while pressing on bladder. This will prevent the bladder from expanding during installation of anti-extrusion assembly (items 10 thru 5).

7. Dip the shoulder end of oil valve (10) and the sealing ring (9) into clean, system fluid. Hold onto threaded portion of oil valve and position the shoulder end of oil valve into shell opening. Next, fold sealing ring (9) and insert it into shell opening behind the oil valve. Push on the oil valve until the sealing ring fits uniformly around the shoulder end of oil valve.

8. Insert retaining ring (8) into shell opening and onto oil valve (10). Center the retaining ring against the sealing ring. Pull the oil valve outwards through the shell opening.

9. Remove inner valve guard cap (2). Install valve core (3) into gas valve portion of bladder with the valve core tool.

10. Fill bladder (13) with compressed air while centering the oil valve and retaining ring at opposite end of accumulator shell.

11. Wrap masking tape around threaded portion of oil valve (10).

12. Install washer (7), o-ring (6), and back-up ring (5) onto oil valve. Push the o-ring and back-up ring uniformly into shell with a blunt screwdriver. Remove the masking tape and apply a small amount of oil to the oil valve threads.

13. Screw slotted nut (4) onto oil valve (10). Tighten the nut securely with a spanner wrench. (Note: Make sure the oil valve does not turn while tightening the slotted nut. Secure the oil valve with a vise or large wrench.)

14. Apply a small amount of oil to pipe (bleeder) plug (4) threads. Screw the plug into oil valve (10).

15. Push on valve core (3) to release air from bladder (13). Remove the valve core to insure all the air is released from bladder. Reinstall the valve core.

16. Install inner valve guard cap (2) over the valve core.

17. Pour a liberal amount of system fluid (approximately 1/10th accumulator content) into oil valve port. Use a funnel for this operation. This step insures the proper lubrication of the bladder and inner shell surface. Roll the accumulator back and forth two or three times. Drain off the fluid. Remove inner valve guard cap (2).

18. Pre-charge the accumulator with nitrogen to approximately 10 PSI. Follow accumulator pre-charge instruction in Section IV. Tighten hex nut (11). Continue to pre-charge the accumulator until the correct pressure for your application is obtained.

19. Apply a soap solution to the valve core area of the accumulator. Check for leaks. *NO LEAKS ARE ALLOWED.* If the accumulator does not accept a pre-charge, refer to the troubleshooting chart (Table 4) for possible repair solutions.

20. Install inner valve guard cap (2) and outer valve guard cap (1).

21. When the accumulator is placed into service, refer to Section III–Installation & Maintenance and the installation drawing for proper instructions.

22. Check the pre-charge pressure within a week of initial pre-charge. The pressure should be checked with zero hydraulic pressure on the circuit. Disconnect the accumulator from the circuit by turning off the line valve and opening the valve to the reservoir.

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Service Parts Information

PRESSURE
SWITCHES

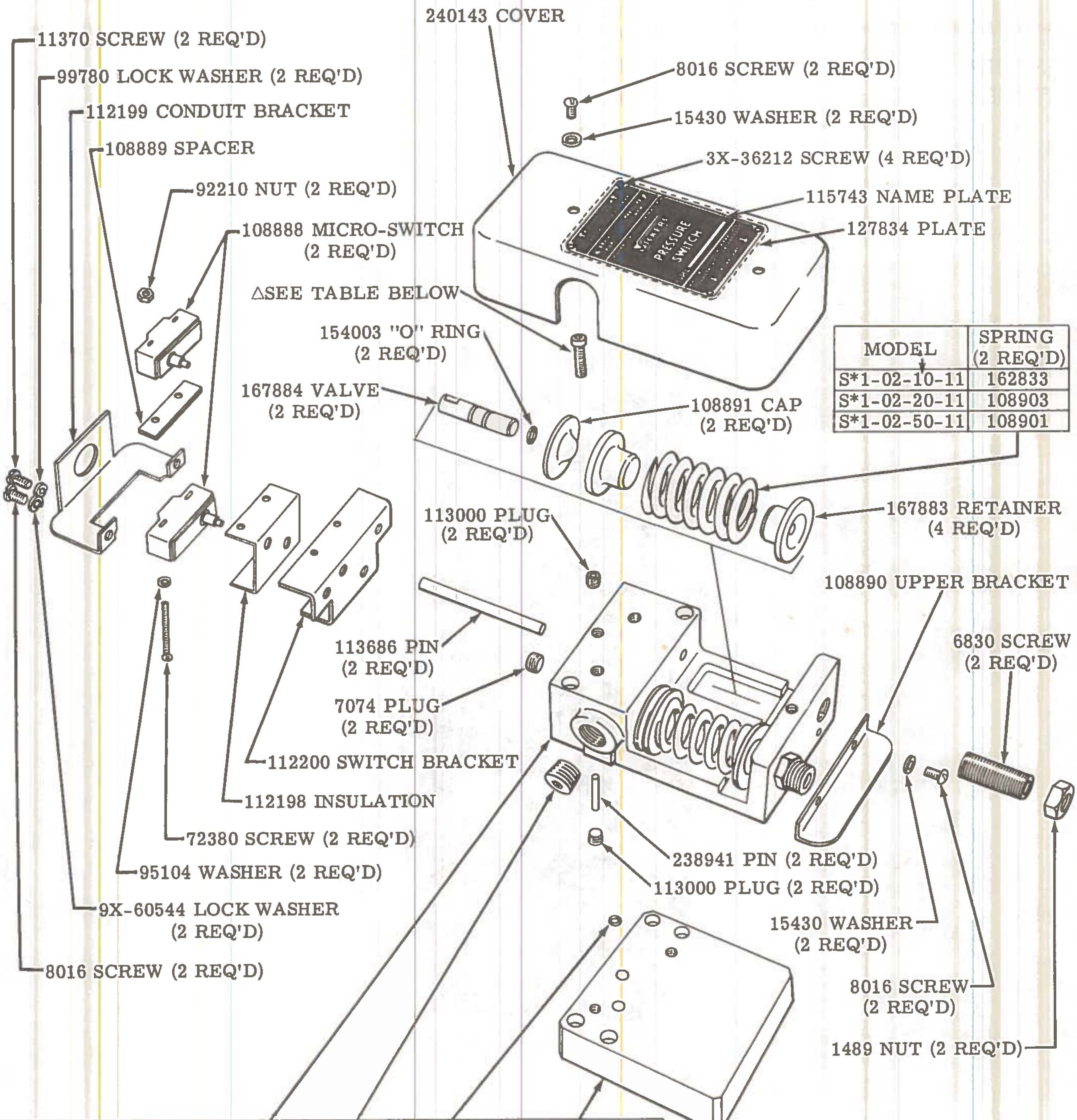
SG1-02-*-1*
ST1-02-*-1*

Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-87 I-1603-S

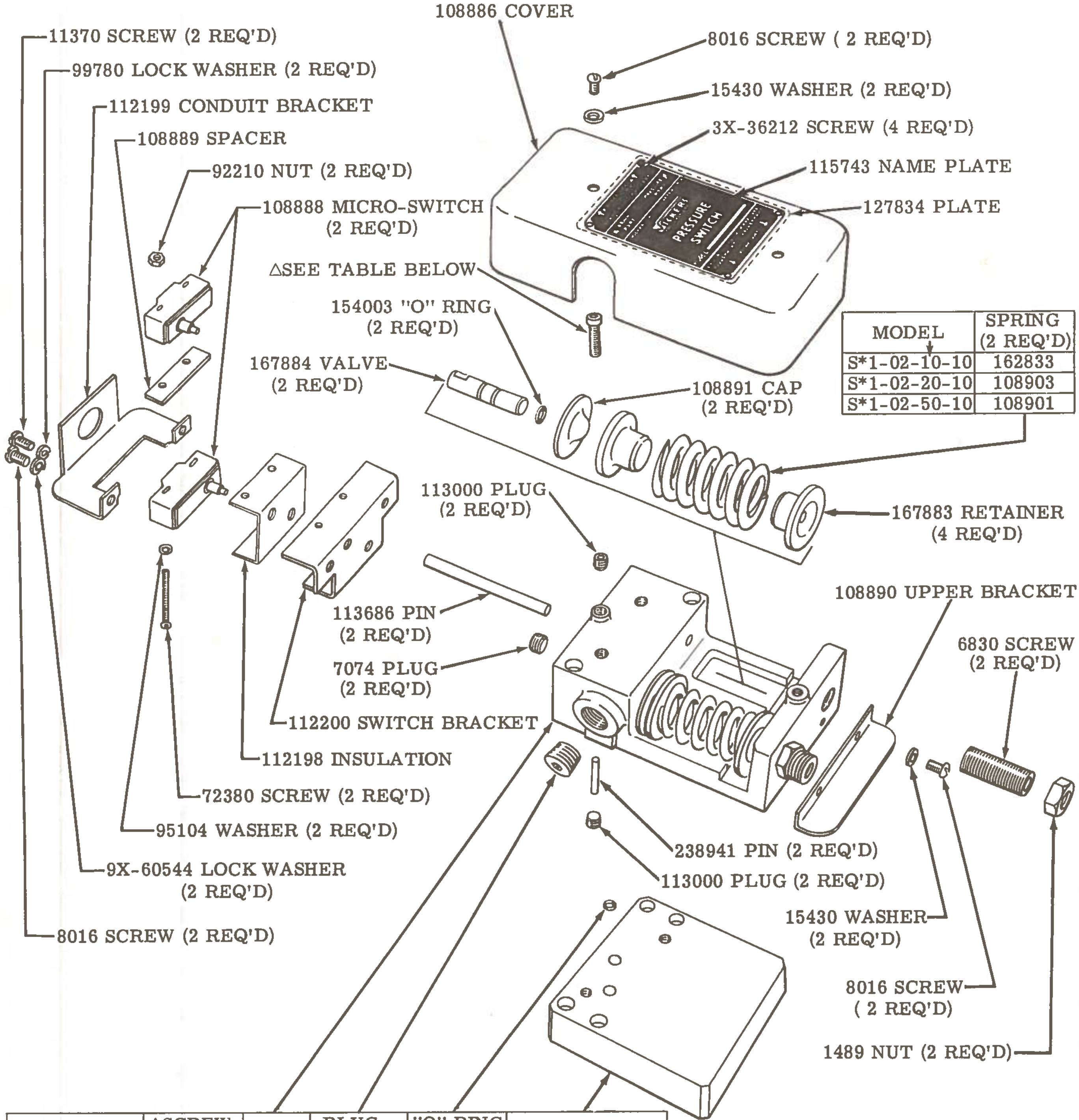
PRESSURE SWITCHES
SG1-02-*0-11
ST1-02-*0-11



MODEL	SPRING (2 REQ'D)
S*1-02-10-11	162833
S*1-02-20-11	108903
S*1-02-50-11	108901

MODEL	△SCREW (2 REQ'D)	BODY	PLUG (2 REQ'D)	"O" RING (2 REQ'D)	SUB-PLATE
SG1-02-*0-11	1036	240042	7075	124582	169161 SG1SM-02-10
					183627 SG1SM-8S-02-10
ST1-02-*0-11	——	235298	——	——	——

PRESSURE SWITCHES
SG1-02-*0-10
ST1-02-*0-10



MODEL	SPRING (2 REQ'D)
S*1-02-10-10	162833
S*1-02-20-10	108903
S*1-02-50-10	108901

MODEL	△SCREW (2 REQ'D)	BODY	PLUG (2 REQ'D)	"O" RING (2 REQ'D)	SUB-PLATE
SG1-02-*0-10	1036	169162	7075	124582	169161 SG1SM-02-10
					183627 SG1SM-8S-02-10
ST1-02-*0-10	——	108885	——	——	——

MODEL CODE BREAKDOWN

S*1 02 *0 1*
[1] [2] [3] [4]

[1] Mounting

G - Gasket Mounted
T - Threaded Connection

[2] Connections

1/4 Inch Connections

[3] Pressure Range

10 - 100 - 1000 PSI
20 - 100 - 2000 PSI
50 - 500 - 5000 PSI

[4] Design

10 Design
11 Design

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

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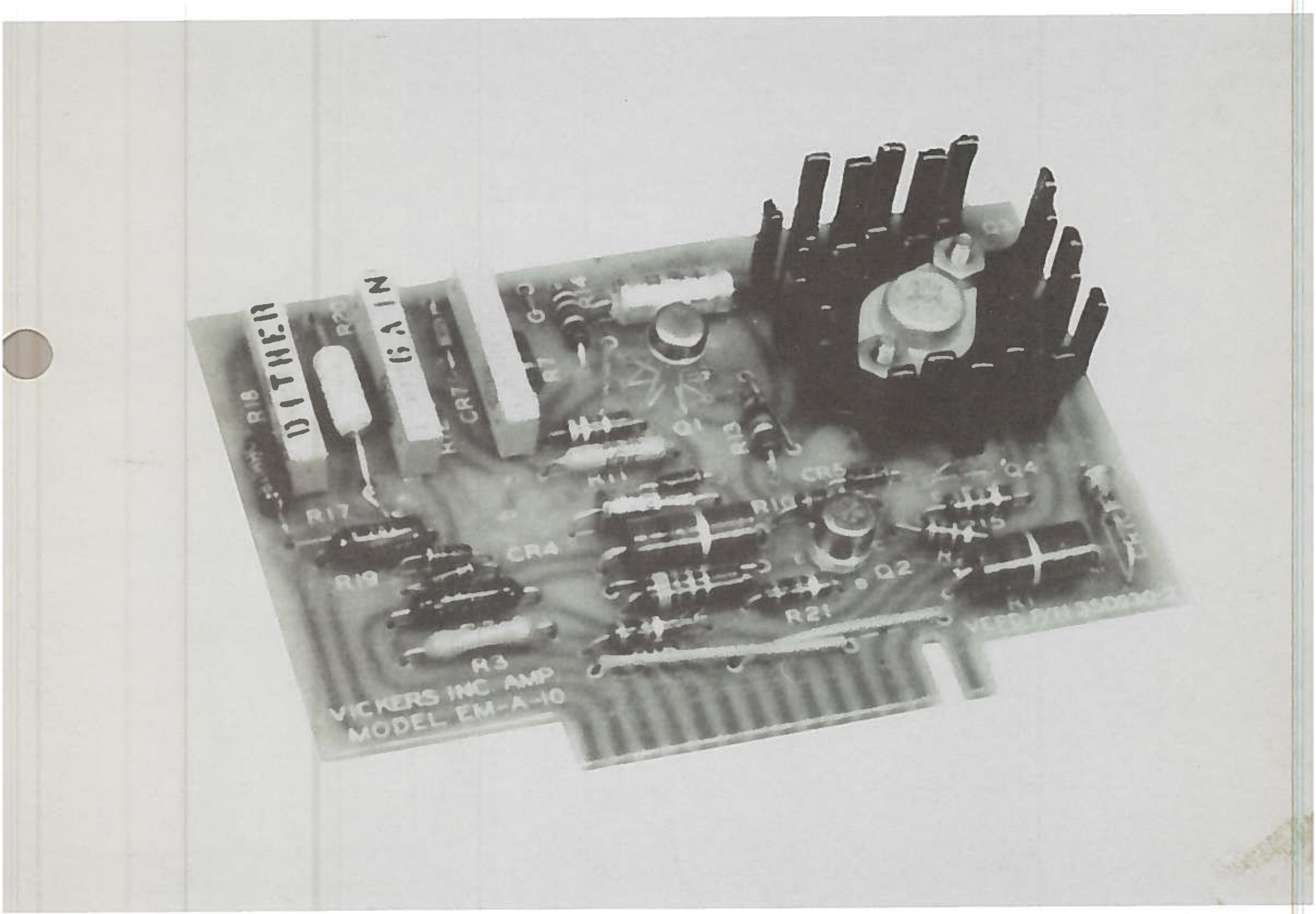
Service Parts Information

SINGLE ENDED LINEAR DC SERVO AMPLIFIER

EM–A–10



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007–0302

Revised 9-1-87

I–3081–S

GENERAL: This manual is written primarily to establish a logical troubleshooting procedure for the solid state EM (electronic modular) amplifier. Complete systems are beyond the scope of this manual and will not be covered. Adequate information is presented for an Electronic Technician to repair the EM-A-10 amplifier.

EM-A-10 (308118) LINEAR SERVO AMPLIFIER

A. DESCRIPTION: The EM-A-10 is a special purpose DC servo amplifier designed specifically for a Vickers SE3 or SF4 flapper type servo valve. The EM-A-10 consists of a high gain summing amplifier, a low gain DC amplifier and a power output stage.

The amplifier module also contains a ±10 volt regulated power supply which may be used for development of input signals through an external 5000 ohm potentiometer.

The complete amplifier and power supply are contained on a plug-in module whose approximate dimensions are 3-1/2 x 5 inches. Refer to Table 1 for electrical and mechanical specifications.

B. SPECIFICATIONS - Performance at 25° C and with rated supply.

	Min.	Typ.	Max.	Units
Input Impedance				
5	4.95	5	5.05	KΩ
4	49.5	50	50.5	KΩ
Input Signal Level	-100	0	+100	Vpeak
Gain: Continuously				
Adjustable: Input 5	2		20	Amps/volt
Input 4	0.20		2	Amps/volt
Output	Single ended with respect to common			
Output Current				
20Ω load	20	200	400	MA
Output current limits	-20		500	MA
Dither current adjustable	3		100	MAp-p
Output drift at max. gain				
During warm-up (30 min.)			±30	MA
vs. temperature			±1	MA/°F
vs. time (after 30 min)			±10	MA/24 hrs.
vs. supply voltage			±1	MA
Frequency Response DC - 300 Hz max. gain full load			-3	DB

	Min.	Typ.	Max.	Units
Regulated Output Supply into 500 Ohm load				
Pin 7 to common	+9	+10	+11	Vdc
Pin 8 to common	-9	-10	-11	Vdc
Temperature Range				
Operating	-29		+71	°C
Storage	-40		+85	°C
Power Supply Requirements				
Voltage Range	+14	+19	+20	Vdc
	-14	-19	-20	Vdc

MECHANICAL SPECIFICATIONS	
Module	Special printed circuit card
Module Size	5.0" x 3.5" x 1.0"
Module Weight	8 oz.
Controls	Screwdriver Adjusted
	Dither
	Gain

Table 1. Electrical and Mechanical Specifications for the EM-A-10.

C. INSTALLATION: The EM-A-10 servo amplifier is designed for mounting on a power supply plate such as the EMP-A-11. Input and output connections to the amplifier circuitry are provided by printed circuit pin connections on the module. These pin connections, when installed into a plug-in receptacle, must be connected as shown in Table 2. TB2 wiring interconnections, located on the EMP-A-11 power supply plate, are shown for convenience.

EMP-A-11 TB2 (J)A/(J)B/(J)C	Plug-In receptacle pin connections	Plug-In module pin connections	Signal
-	a	1	Dither (13 Vac)
-	b	2	N.C.
-	c	3	-19 Vdc input
4	d	4	Input #1
5	e	5	Input #2
6	f	6	Summing Junction
7	h	7	Regulated +DC output
8	j	8	Regulated -DC output
-	k	9	N.C.
-	l	10	N.C.
1	m	11	Negative output to coil
2	n	12	Positive output to coil
-	p	13	+19 Vdc input
-	r	14	Slotted for polarizing key
3	s	15	Common

Table 2. The EM-A-10 Plug-In Receptacle and Terminal Board Interconnecting Wiring

Portions of the EM-A-10 servo amplifier are of incapsulated construction and must be replaced as complete assemblies. Amplifier A1 and A2 shown on the schematic diagram figure 1 are examples of this type of construction. Replacement of A1 and A2 require factory adjustments to be performed to the resistance values designated by an asterisk (*). Therefore, should replacement of either amplifier be required, it is recommended that installation be accomplished by Vickers. Replacement EM-A-10 amplifiers are available.

D. CIRCUIT DESCRIPTION:

Amplifier Section - The EM-A-10 is a DC amplifier, consisting of a high gain summing preamplifier feeding a unity gain buffer amplifier which drives a power output stage.

The output stage is statically adjusted to produce 200 Milliamperes (MA) of current through the 20Ω servo valve coil, (Vickers type SE3/SF4 servo valve) and varies from this 200 MA value with variations in input signal.

An explanation of the circuitry follows: Refer to the complete schematic diagram figure 1, the pictorial diagram figure 2, and the simplified schematic diagram figure 3.

Command and feedback signals are connected through R1 and R2 to the input of amplifier A1. Resistors R1, R2, and amplifier A1's input resistance form a summing network which permits a difference potential to be developed across amplifier A1's input resistance. The amplitude of this potential is determined by the polarity and amplitude of the input signals, the input coupling resistance R1 and R2, and the input resistance of amplifier A1. Under normal operating conditions, the junction of R1 and R2 is maintained at "virtual ground" within a few millivolts by A1. Diodes D8 and D9 limit amplitude extremes at the input of A1 to approximately ±.5 volt maximum, if the amplifier output saturates. Amplifier A1 inverts the output signal with respect to the input signal, permitting gain adjustment to be obtained by a negative feedback arrangement through resistors R3 and R4. A portion of the inverted output is allowed to develop across the input resistance of amplifier A1. This negative feedback subtracts from the input signal subsequently reducing the gain of the amplifier.

The output of A1 is used to drive amplifier A2 which in turn provides the current necessary to drive power transistor Q5 and Q6. (Shown on the complete schematic diagram figure 1).

Amplifiers A1 and A2 are of the same type. But, amplifier A1's gain differs from that of amplifier A2, due to wiring arrangement. Amplifier A1's gain is essentially the ratio of feedback to input resistance or:

$$\text{A1 Gain - Input 1 (Approx. gain of 2)} = \frac{R3 + \dfrac{R4 \cdot R4a}{R4 + R4a}}{R1}$$

$$\text{A1 Gain - Input 2 (Approx. gain of 20)} = \frac{R3 + \dfrac{R4 \cdot R4a}{R4 + R4a}}{R2}$$

Amplifier A2 is connected to provide a non-inverting, unity gain amplifier characteristic. Unity gain amplifiers (gain of 1) provide isolation between circuits (buffer action) and will permit a source with low current capacity (A1) to drive a heavy load (Q5 and Q6).

Transistor Q5 and Q6 develop the necessary output current for the servo coil. Resistors R20 and R20a bias amplifier A2 and establish the 200 MA null current through Q6, D6, the servo valve coil, and resistor R26 (the current sensing resistor).

A voltage is developed across R26 directly proportional to the current through it. This voltage is reduced through voltage divider action by R23 and R21, and is fed to pin two (2) of the unity gain amplifier A2 reducing its gain. This gain reduction (negative feedback) improves the linearity of the driver stage A2 and the output transistor circuit Q5 and Q6. R25a and R25b are adjusted to limit the maximum current. When the voltage across R25a and R25b exceeds the threshold voltage of D4 and D5, the diodes conduct limiting a further current rise in the output circuit.

Dither - The dither signal (60 to 400 Hertz) is connected to pin 1 of the plug-in module. A variable resistive divider network R16 and R18 provide adjustment of the value of dither. This dither is applied to pin two (2) of amplifier A2 through resistor R17. Dither signal is used to keep the servo flapper in constant

motion, thus preventing the flapper from magnetizing in a locked condition against the orifice. Constant motion of the flapper will also reduce the effect of silting (fine particle build-up around the orifice).

Power Supplies - Four regulated power supplies are provided on the plug-in module. Refer to the schematic diagram figure 1. The amplifier section utilizes both a positive ten (+10) and a negative ten (-10) volt supply for operation. A positive ten (+10) and a negative ten (-10) volt supply is also available for external use.

The externally connected supplies may be used for amplifier control circuitry if desired, thus providing the control voltage and amplifiers necessary for a complete system in one plug-in module.

All the regulated supplies operate in a similiar manner, therefore, explanation of only one will be presented.

Upon application of negative nineteen (-19) volts DC to pin 3 of the plug-in module, zener diode Z2 conducts through R7 establishing a regulated source voltage for the base of Q2. A portion of this regulated voltage is applied to Q2 through the voltage divider network of R9, D2, and R11. Diode D2 and resistor R11 shunt the base resistance of Q2 and reduce the base drive as the temperature rises. This reduction in drive prevents thermal runaway of transistor Q2. Emitter resistor R13 swamps the emitter base junction resistance and prevents a large increase in emitter current, particularly at low temperatures. Q2 and R13 act as a variable voltage dropping resistor for Zener Diode Z4, and maintain a constant current through Z4 with varying input voltages. The combined action of Q2 and Z4 provide a regulated -10 volt source at pin 8 of the plug-in module.

E. TROUBLE SHOOTING PROCEDURE: Determine if the EM-A-10 module is functional. Refer to the schematic diagram figure 1 and the pictorial diagram figure 2.

NOTE

The EMP-A-11 power supply or its equivalent must be used to perform the following test. Minor wiring changes may be required if an equivalent supply is used.

1. Remove electrical power from the system.
2. Remove the input signal connections 4, 5, 6, 7, and 8. Tape the wire ends and symbolize to prevent error.
3. Connect a linear taper, 5000 ohm test potentiometer as shown in figure 4.
4. Remove the EM-A-10 plug-in module. Use the ohmmeter on the low ohm scale to check the resistance of the load as follows:

Connect the ohmmeter between J* - m & n. A reading of approximately 20 ohms is considered normal. If the reading is normal, reinsert the plug-in module and proceed with the test.

NOTE

The characteristics of this amplifier are such that once conduction starts, a very small change in input signal level will cause a very large change in output current. Therefore, the 5000 ohm command test potentiometer (shown in figure 4) will seem to have no effect on the measured output voltage level until the center of the control is reached, then the voltage level will change rapidly from 0 to -1.5 volts. To obtain the -0.6 volts (200 MA) reading, the control must be varied very slowly when the center of the control is reached.

5. Connect a volt-ohmmeter between TB2*-2 and TB2*-3 (common ground reference). Apply power and measure for negative .6 volts (200 MA). The voltage should vary from approximately zero (0) volts at one end of the test potentiometer adjustment range to approximately negative 1.5 volts at the other. If the amplifier performs as indicated, it is operating normally.
6. Remove AC power from the system.
7. Connect symbolized wiring removed in step E. 2.

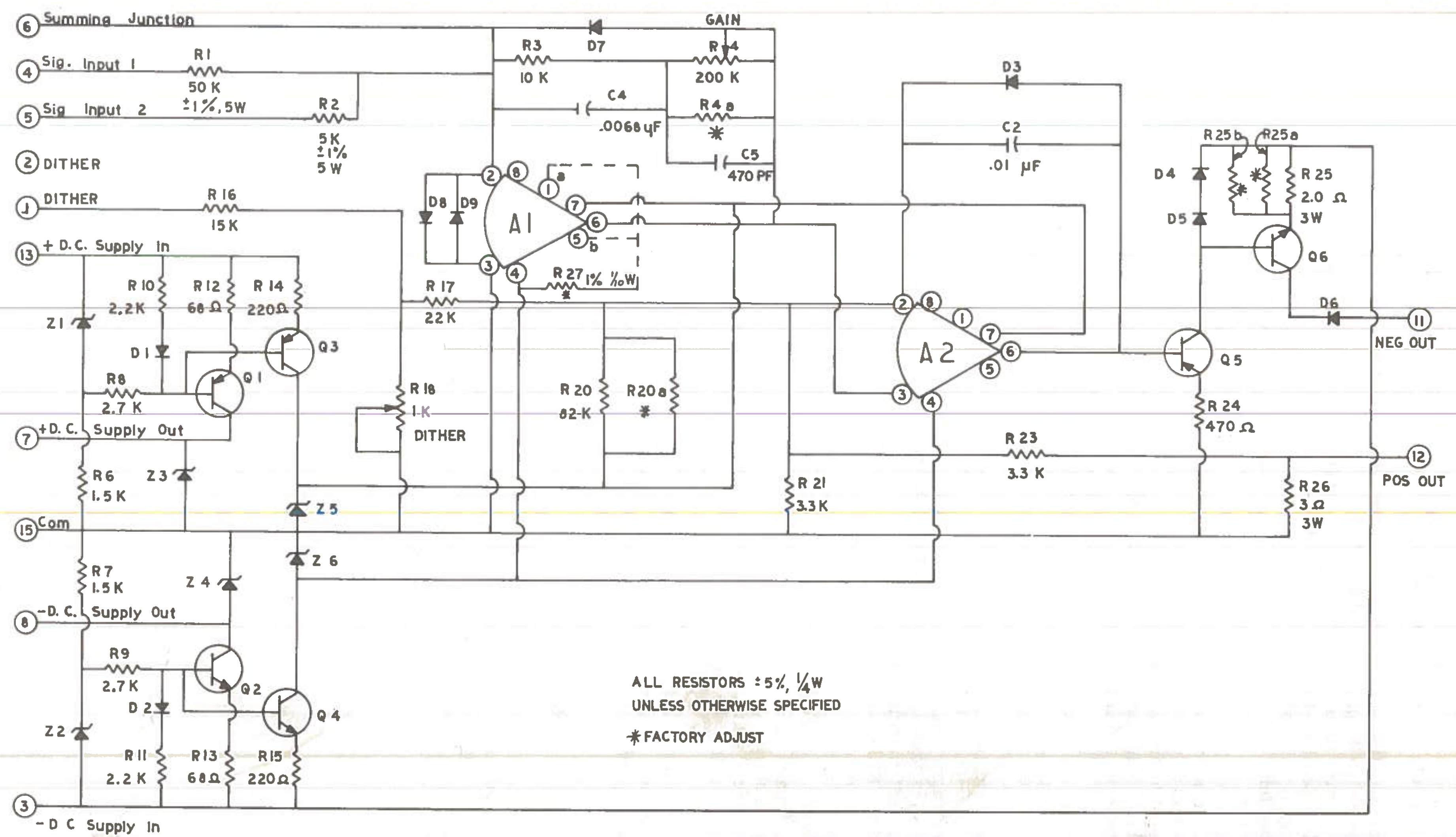


Figure 1. Complete Schematic Diagram for the EM-A-10.

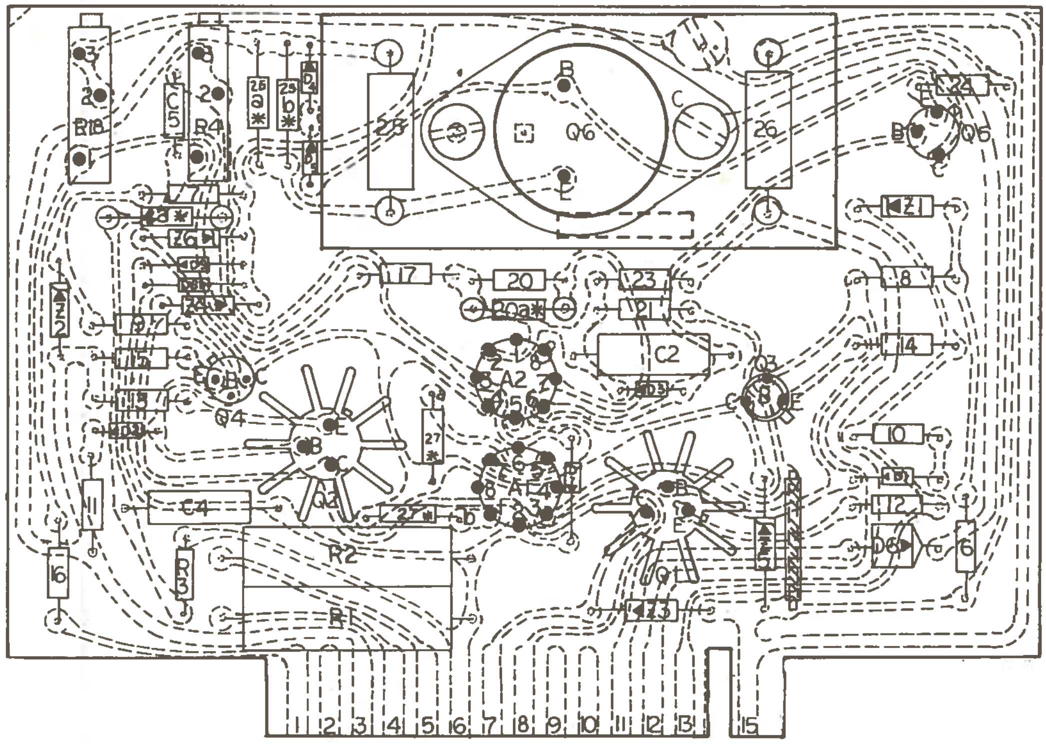


Figure 2. Pictorial Diagram of the EM-A-10

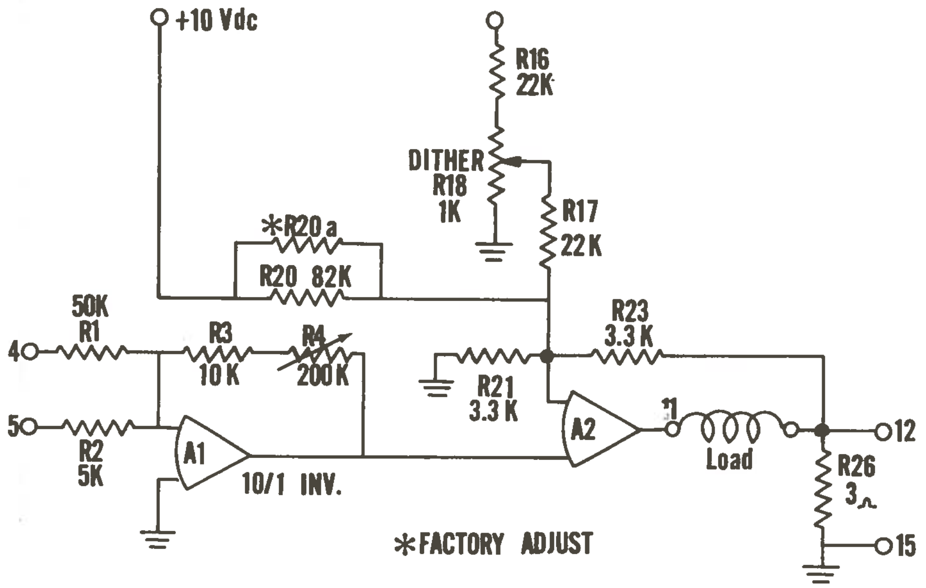
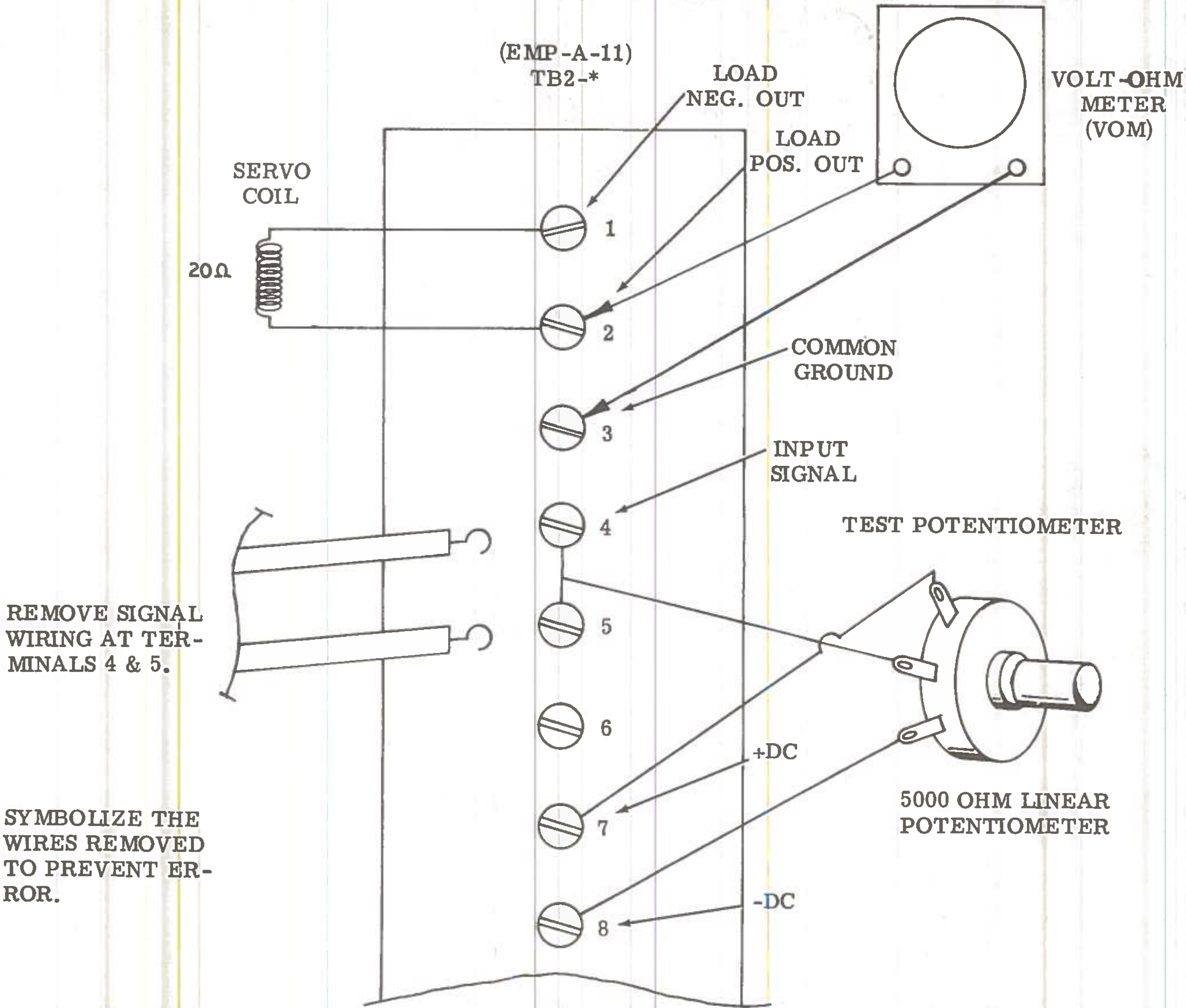


Figure 3. Simplified Schematic Diagram of the EM-A-10



NOTE: IF THE EMP-A-11 POWER SUPPLY IS NOT USED, CONNECT THE POWER SOURCE AS SHOWN TO TEST THE EM-A-11 AMPLIFIER.

Figure 4. Test Potentiometer Wiring Diagram.

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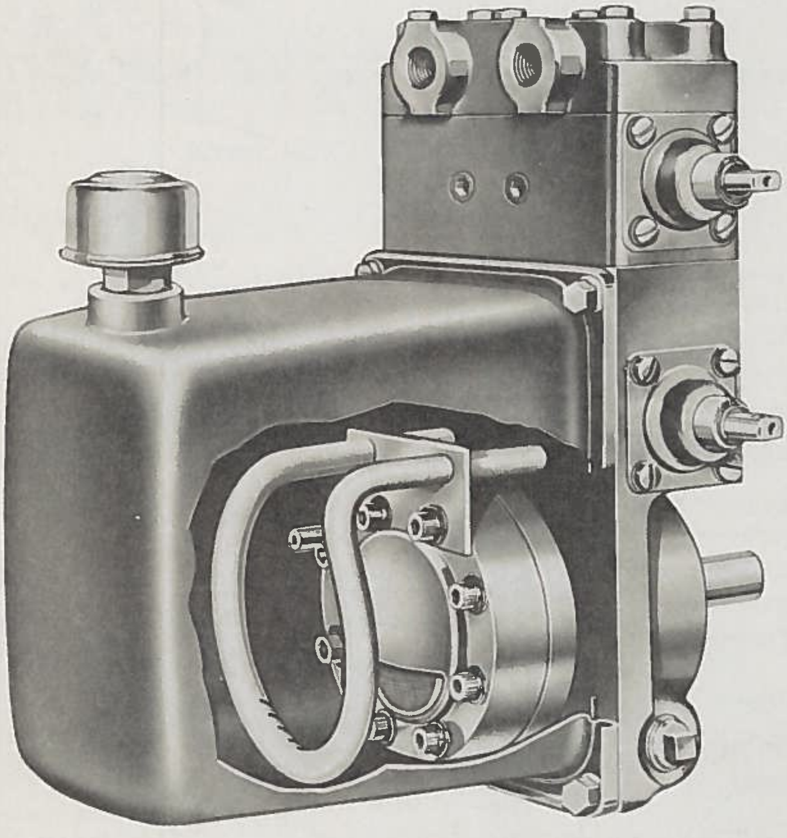
Service Parts Information

PK Series Power Packages

PK1-****-*-12
PK6-****-*-12
PK11-****-*-12



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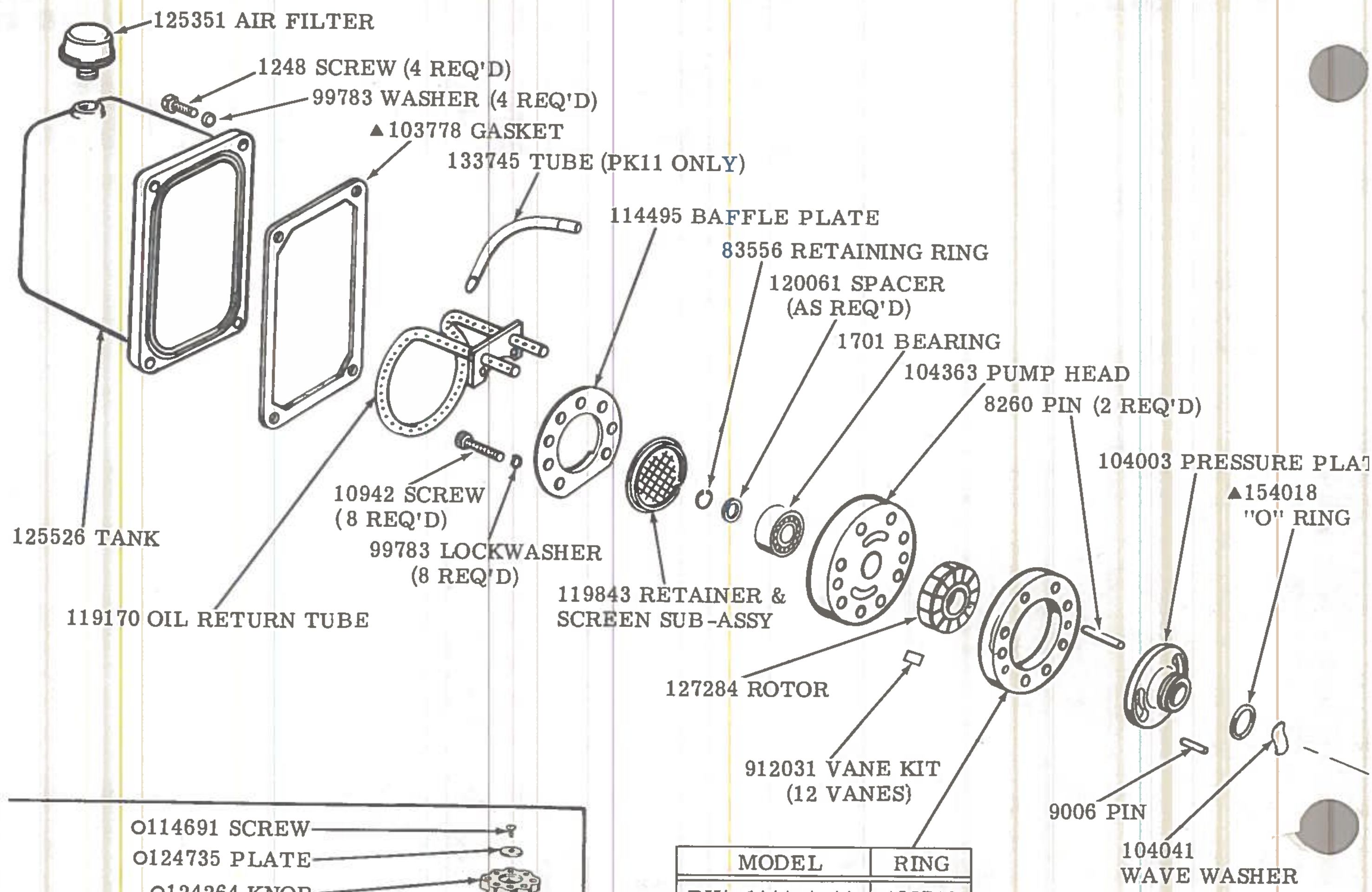
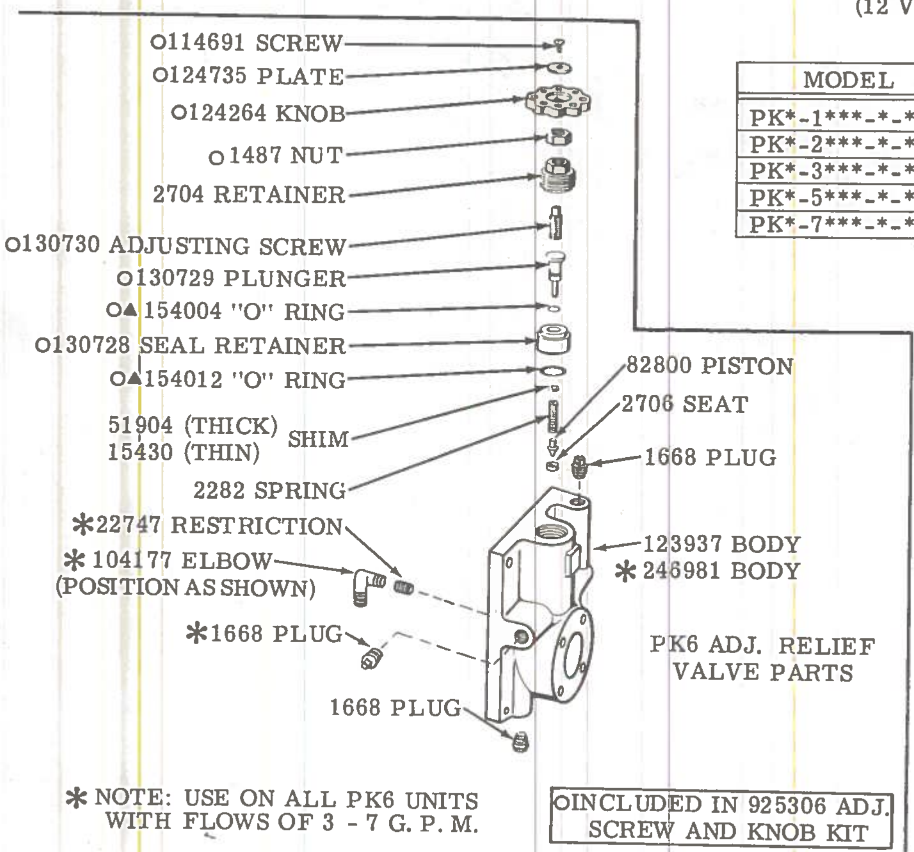
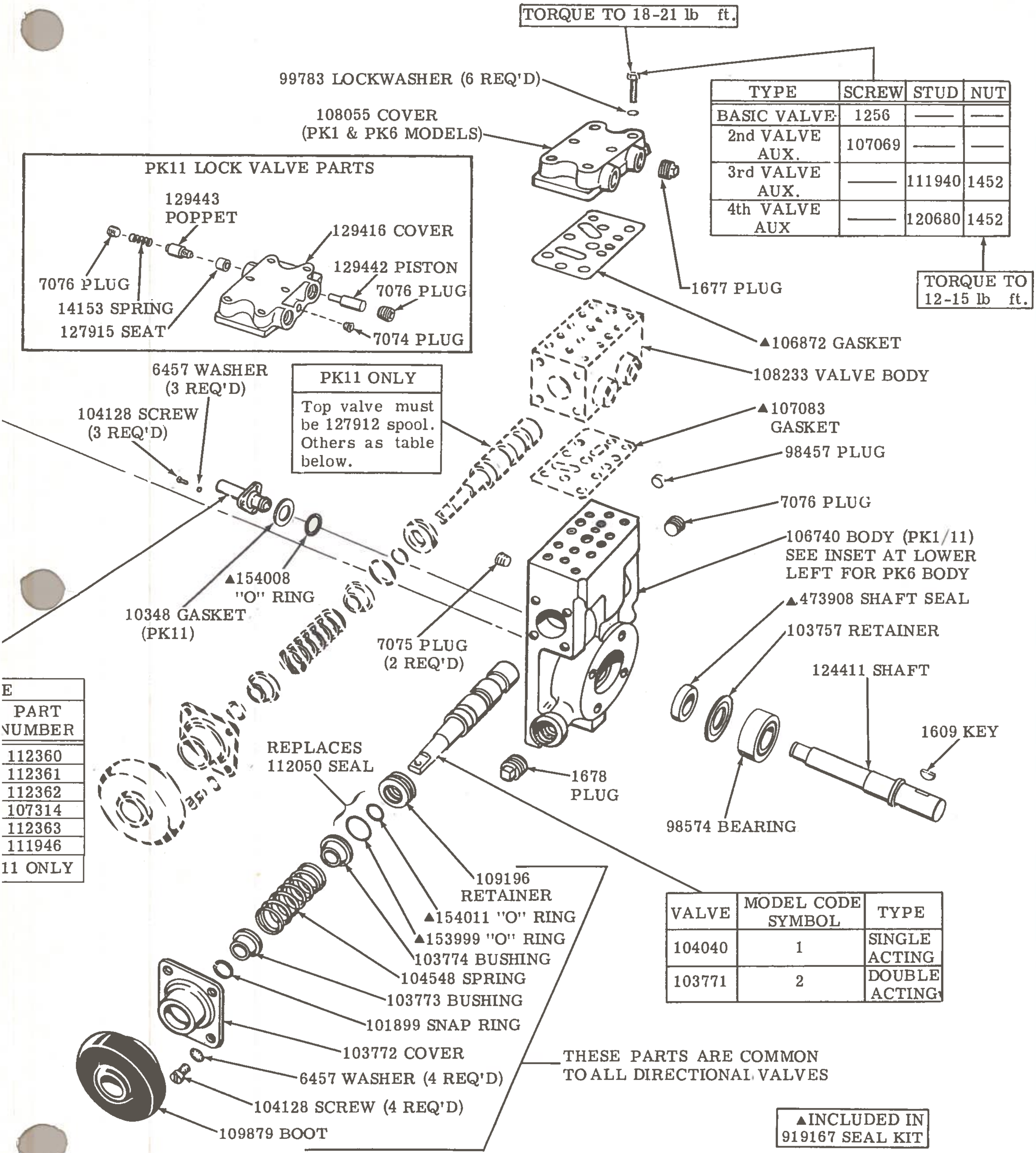
Revised 7-1-89 I-3006-S





MODEL	RING
PK*-1***-*-**	120713
PK*-2***-*-**	104165
PK*-3***-*-**	104166
PK*-5***-*-**	104018
PK*-7***-*-**	109999

MODELS	RELIEF VA	
	SUFFIX	PRESSURE (P. S. I.)
ALL	A	250
	B	500
	C	750
	D	1000
PK*-2000	E	1250
PK*-5000	F	1500
RELIEF VALVE USED ON PK1		



TYPE	SCREW	STUD	NUT
BASIC VALVE	1256	——	——
2nd VALVE AUX.	107069	——	——
3rd VALVE AUX.	——	111940	1452
4th VALVE AUX	——	120680	1452

E
PART NUMBER
112360
112361
112362
107314
112363
111946
11 ONLY

VALVE	MODEL CODE SYMBOL	TYPE
104040	1	SINGLE ACTING
103771	2	DOUBLE ACTING

MODEL CODE BREAKDOWN

PK * – * * * * * – * – 1 2 (L)

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11]

[1] Power Pack

[2] Series

1 – Long Tank
6 – ADJ. Relief Valve
11 – Lock Valve In Cover

[3] Nominal Pump Capacity

[4] Basic Valve

0 – None
1 – Single Acting
2 – Double Acting

[5] Second Valve

0 – None
1 – Single Acting
2 – Double Acting

[6] Third Valve

0 – None
1 – Single Acting
2 – Double Acting

[7] Fourth Valve

0 – None
1 – Single Acting
2 – Double Acting

[8] Relief Valve
(Working Pressure)

[9] Design

[10] Modification

[11] Rotation
(Optional)

L – Left Hand (CCW Rotation)

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR, and OFRS filter series are reecommended.

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Service Parts Information

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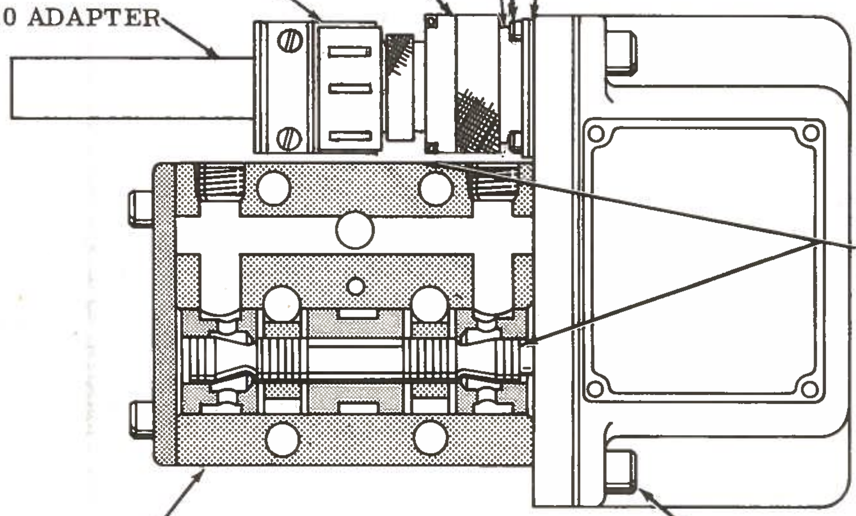
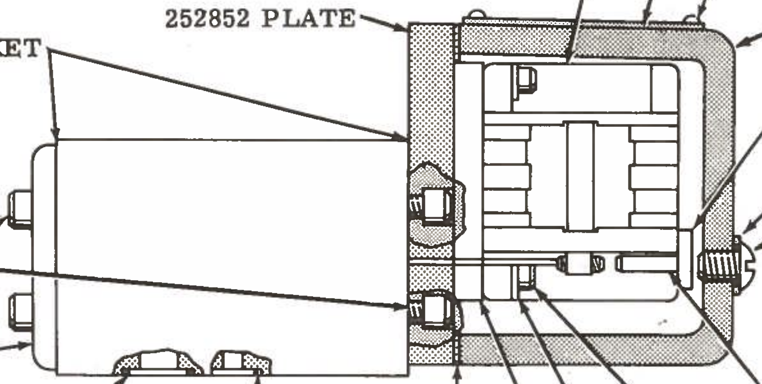
SINGLE STAGE SERVO

SC4-03-*-20(S**)**



CAUTION
BODY AND SPOOL TO BE KEPT IN MATCHED SETS. THEY CAN BE IDENTIFIED BY NUMBERS ETCHED IN THESE AREAS.

BODY, SPOOL, WIRE & SCREW SUBASSY	SEE MODEL CODE
258660	STANDARD
287583	S-13



▲INCLUDED IN 919252 SEAL KIT

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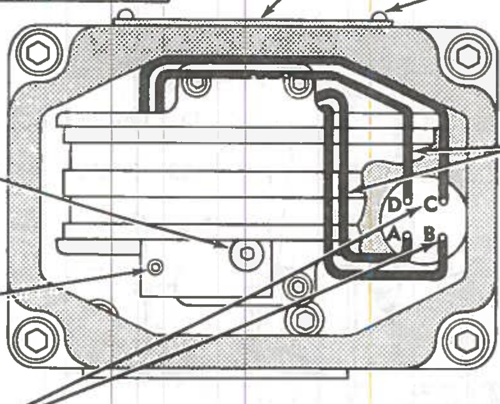
COIL WIRING PROCEDURE
SOLDER RED LEAD "A" TO TERMINAL "A"
SOLDER LEAD "B" TO TERMINAL "B"
SOLDER LEAD "C" TO TERMINAL "C"
SOLDER RED LEAD "D" TO TERMINAL "D"

NOTE
SEE I-1880-S FOR TORQUE MOTOR ALIGNMENT INFORMATION.



TORQUE MOTOR ASSY. NO.	WIRE COLORS AT TERMINALS "B" & "C"	NOMINAL CURRENT & RESISTANCE VALUES					
		RESISTANCE OHMS/COIL	DIFF. CONN. (PUSH PULL) MILLI-AMPS	PARALLEL CONNECTED		SERIES CONNECTED	
				RES.	CURR.	RES.	CURR.
212619	YELLOW	40	300	20	300	80	150
207691	WHITE	280	100	140	100	560	50
207692	BLUE	2200	40	1100	40	4400	20
211458	BLACK	5300	25	2650	25	10600	12.5

MODEL CODE BREAKDOWN

SC 4 - 03 - * - 20 - (S**)**

- S — SERVO VALVE
- C — SINGLE STAGE SLIDING SPOOL
- 4 — 4-WAY
- 03 — 3/8 INCH SIZE NOMINAL
- *** — COIL RESISTANCE

CODE	COIL RESISTANCE OHMS/COIL
004	40
028	280
220	2200
530	5300

- 20 — DESIGN NUMBER OF VALVE
- (S**) — SPECIAL FLOW CHARACTERISTICS
  - S-13 - 1 GPM MAX. FLOW AT 1000 PSI PRESSURE DROP
  - S-15 - EXTERNAL DRAIN PORT
  - OMITTED-STD 3-3/4 GPM MAX. FLOW AT 1000 PSI PRESSURE DROP

To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

Litho in U.S.A.

Service Parts Information

GASKET MOUNTED ROTARY TYPE PILOT VALVES

C2-573 and C2-1573 Series
C3-573 and C3-1573 Series

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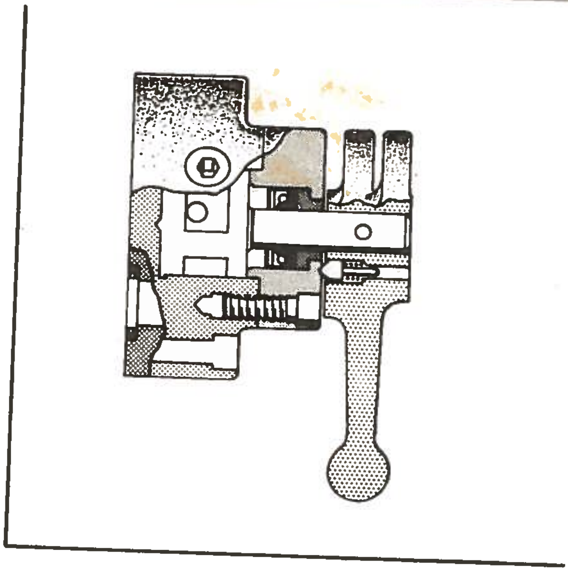
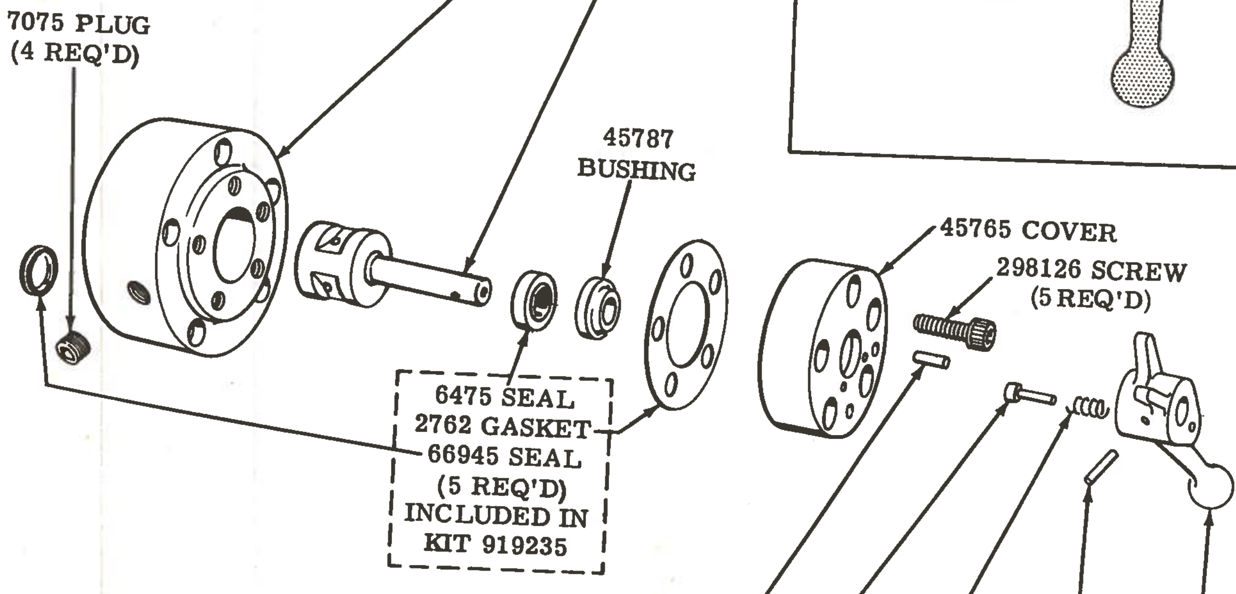


MODEL	BODY	SPOOL
C2-573-*	104396	45770
C3-573-*	247176	
C2-1573-*	104397	45779
C3-1573-*	261104	



MODEL	PIN	STOP	SPRING	PIN	LEVER
C2-573/1573	——	——	——	——	——
C3-573/1573					
C2-573/1573-A	——	2211	2212	2214	2765
C3-573/1573-A				159289	
C2-573/1573-B	2222 (2 REQ'D)			2214	24767
C3-573/1573-B				159289	
C2-573/1573-C				2214	36327
C3-573/1573-C				159289	

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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Service Parts Information

ROTARY TYPE PILOT VALVES

C2-529-* Series
C2-1529-* Series

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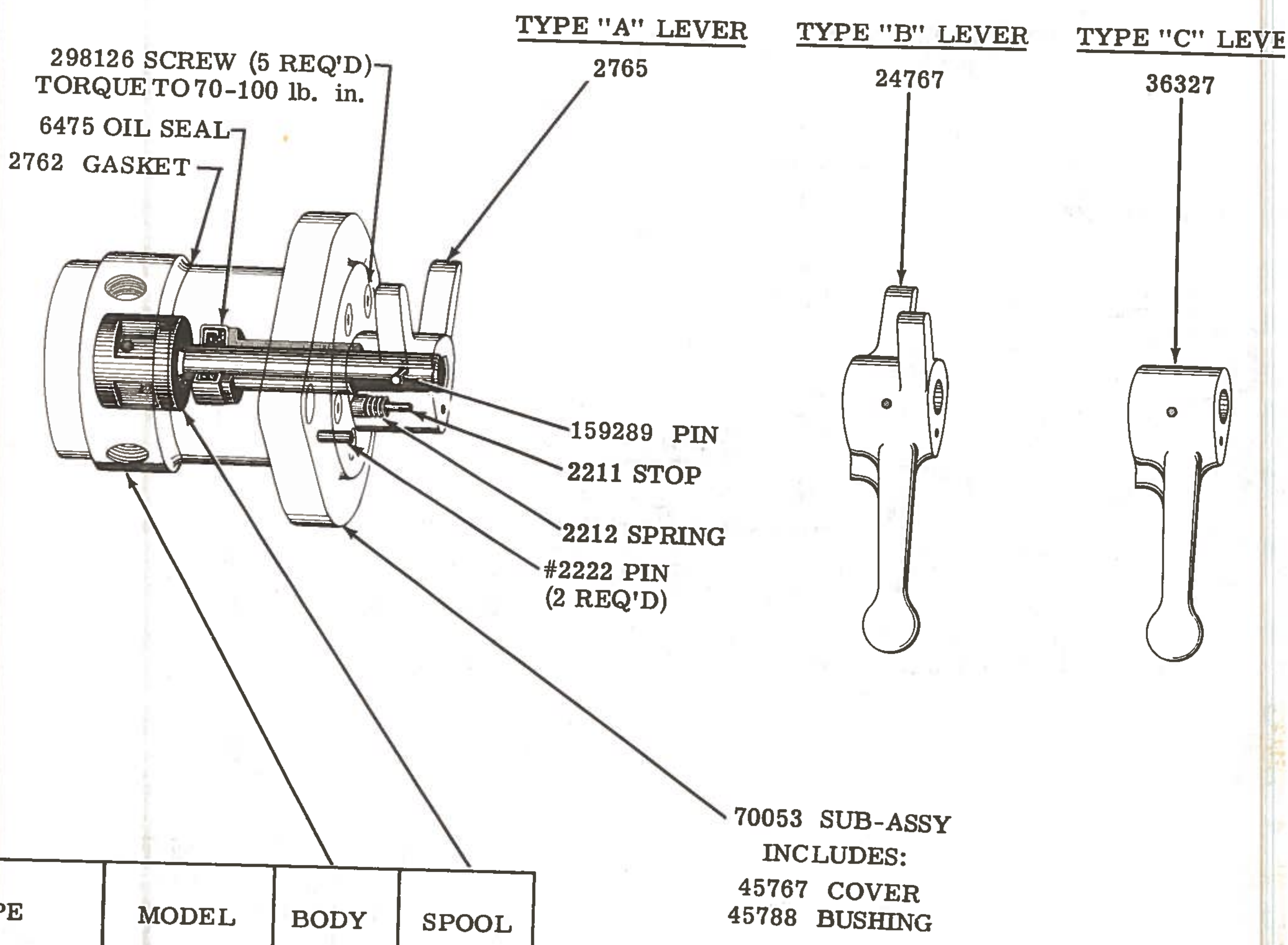

TYPE	MODEL	BODY	SPOOL
Internal Drain	C2-529-*	3268	45771
External Drain	C2-1529-*	7266	45780

NOTE
REFER TO INSTALLATION DRAWING 514200 FOR CORRECT LOCATIONS OF TYPE "A", "B", AND "C" LEVERS.

USED ON MODELS WITH TYPE "B" OR TYPE "C" LEVER ONLY.

WARNING: USE THIS DRAWING FOR PARTS INFORMATION ONLY.

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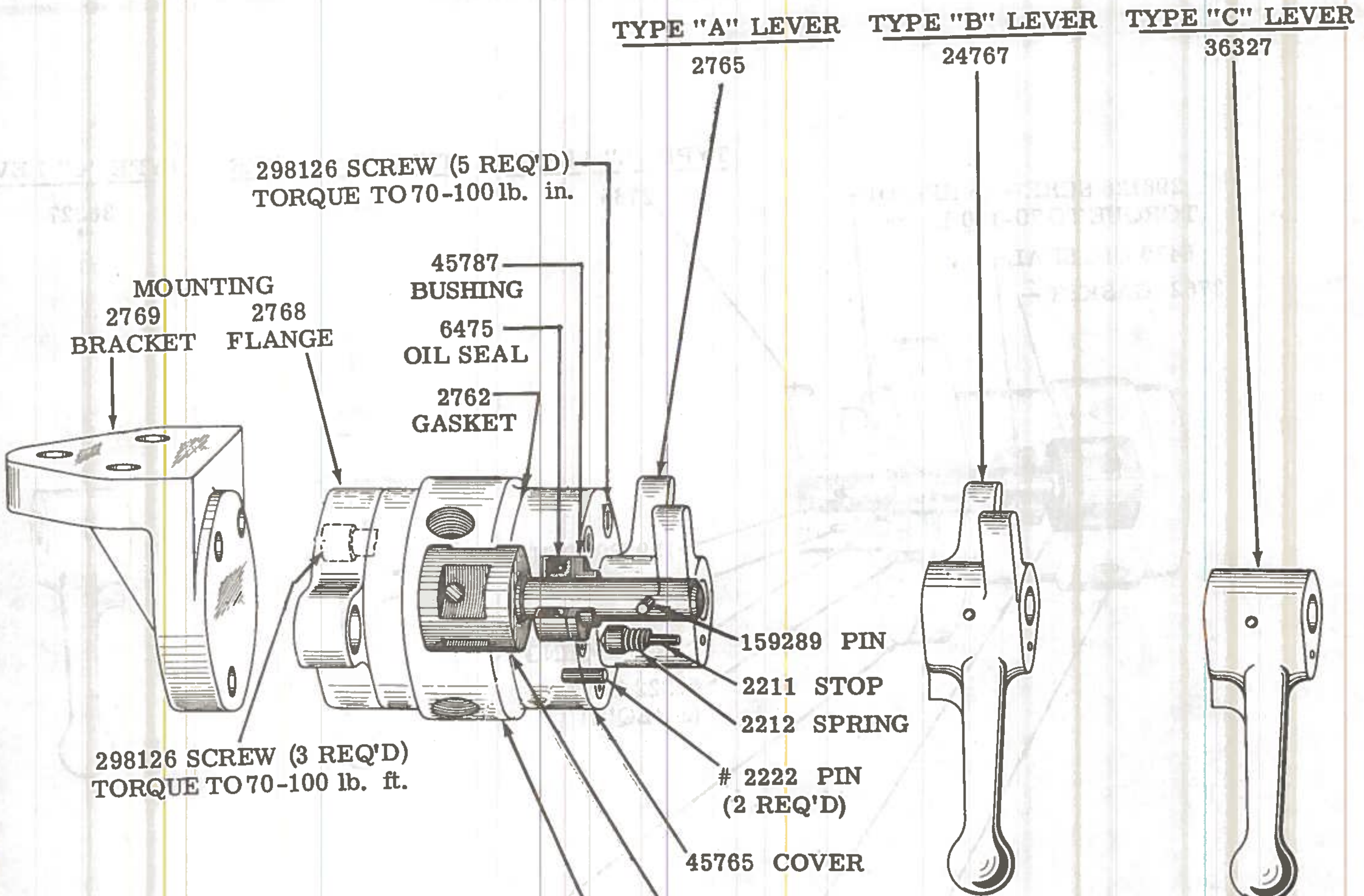


NOTE
REFER TO INSTALLATION DRAWING 514200 FOR CORRECT LOCATIONS OF TYPE "A", "B", AND "C" LEVERS.

MODELS WITH INTERNAL DRAIN				BODY	SPOOL	TYPE OF MOUNTING
NO LEVER	TYPE "A" LEVER	TYPE "B" LEVER	TYPE "C" LEVER			
C2-523	C2-523-A	C2-523-B	C2-523-C	3268	45770	FLANGE
C2-524	C2-524-A	C2-524-B	C2-524-C			BRACKET
C2-525	C2-525-A	C2-525-B	C2-525-C			
MODELS WITH EXTERNAL DRAIN						
C2-1523	C2-1523-A	C2-1523-B	C2-1523-C	7266	45779	FLANGE
C2-1524	C2-1524-A	C2-1524-B	C2-1524-C			BRACKET
C2-1525	C2-1525-A	C2-1525-B	C2-1525-C			

USED ON MODELS WITH TYPE "B" OR TYPE "C" LEVER ONLY.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

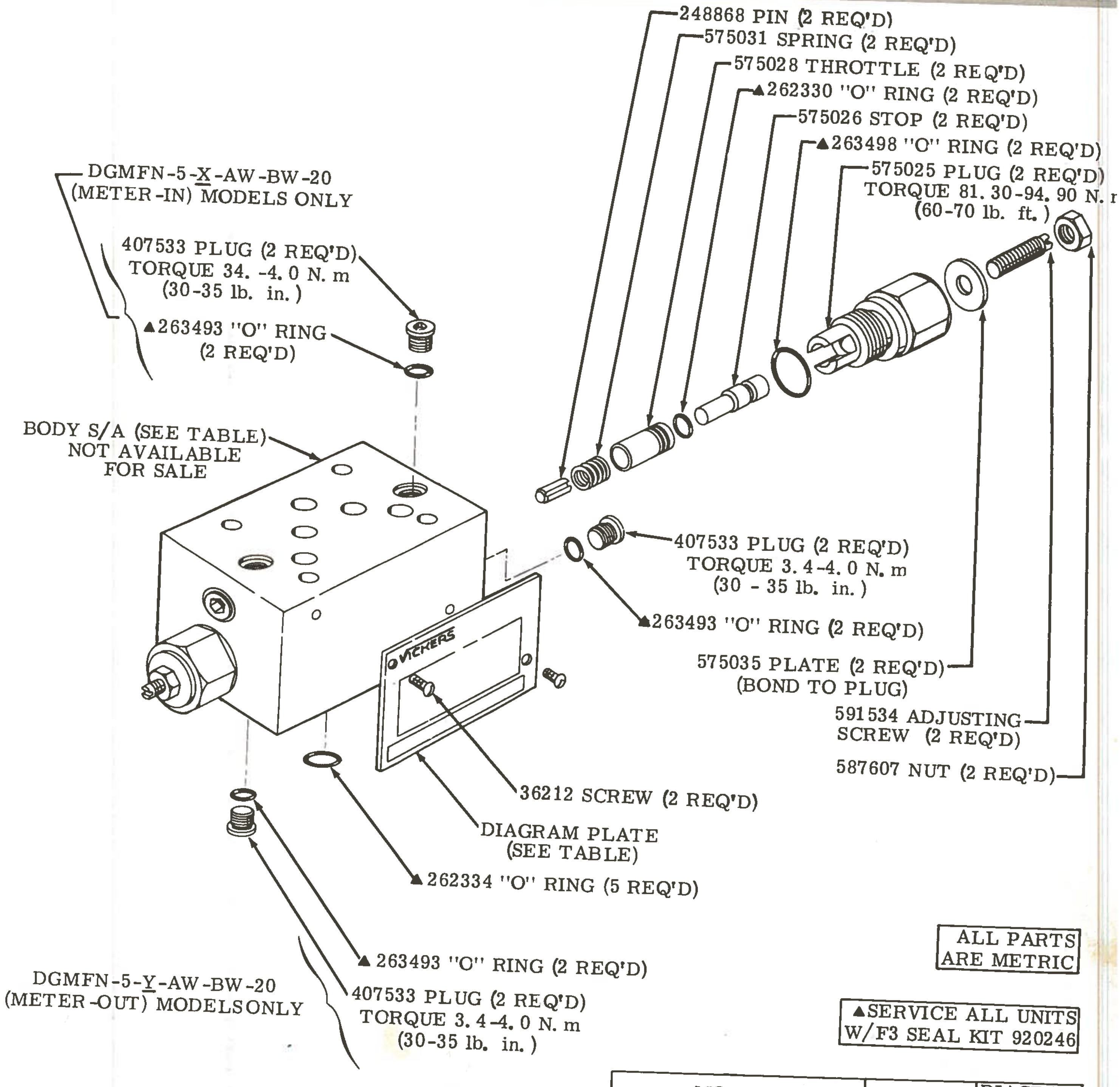
Service Parts Information

FLOW CONTROL MODULE

VICKERS®
A TRINOVA COMPANY

DGMFN-5-Y-AW-BW-20

DGMFN-5-X-AW-BW-20



ALL PARTS ARE METRIC

▲SERVICE ALL UNITS W/F3 SEAL KIT 920246

MODEL	BODY S/A	DIAGRAM PLATE
DGMFN-5-X-AW-BW-20	587975	630317
DGMFN-5-Y-AW-BW-20	575039	630318

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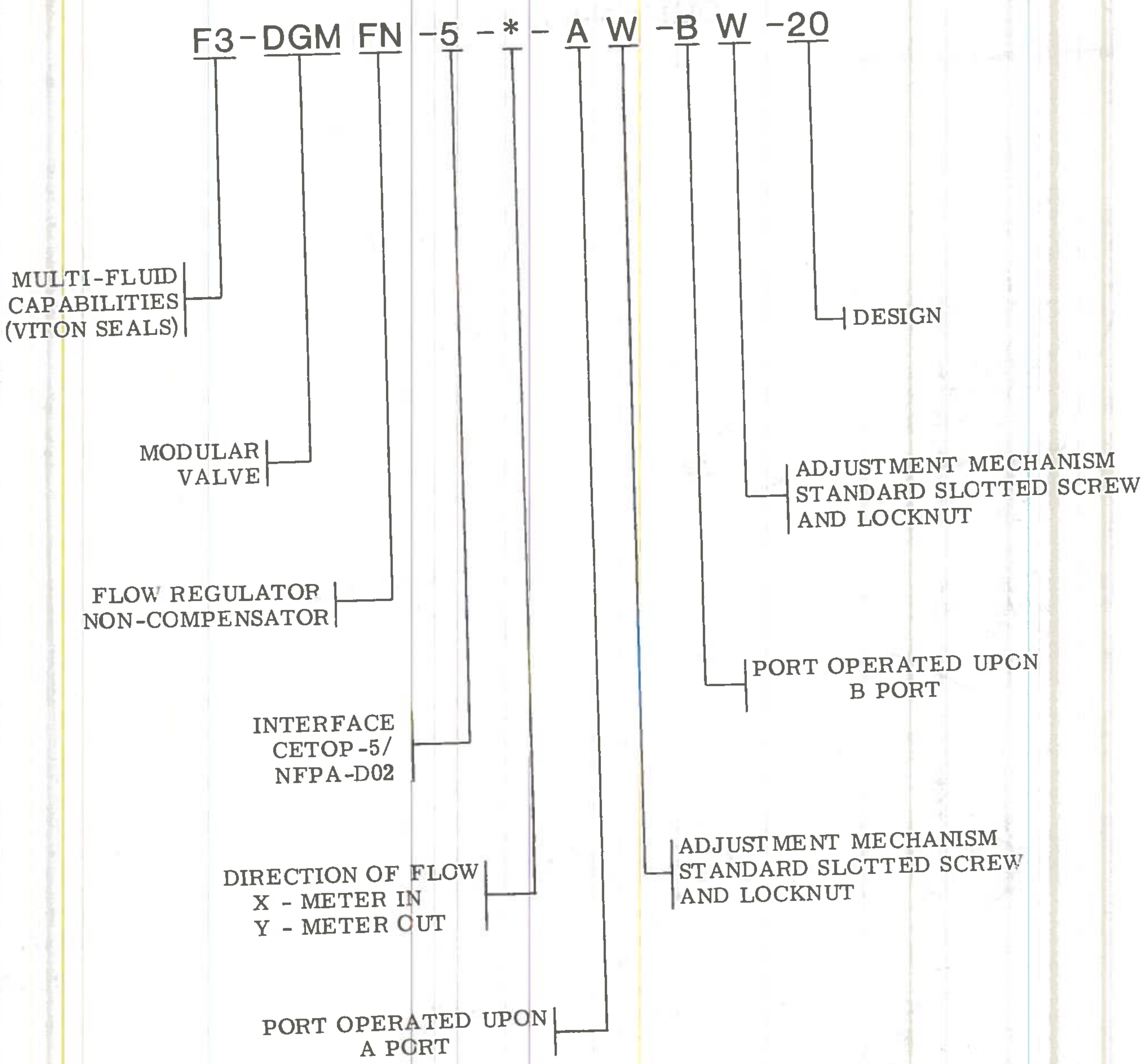
MODEL CODE BREAKDOWN



To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

Litho in U. S. A.

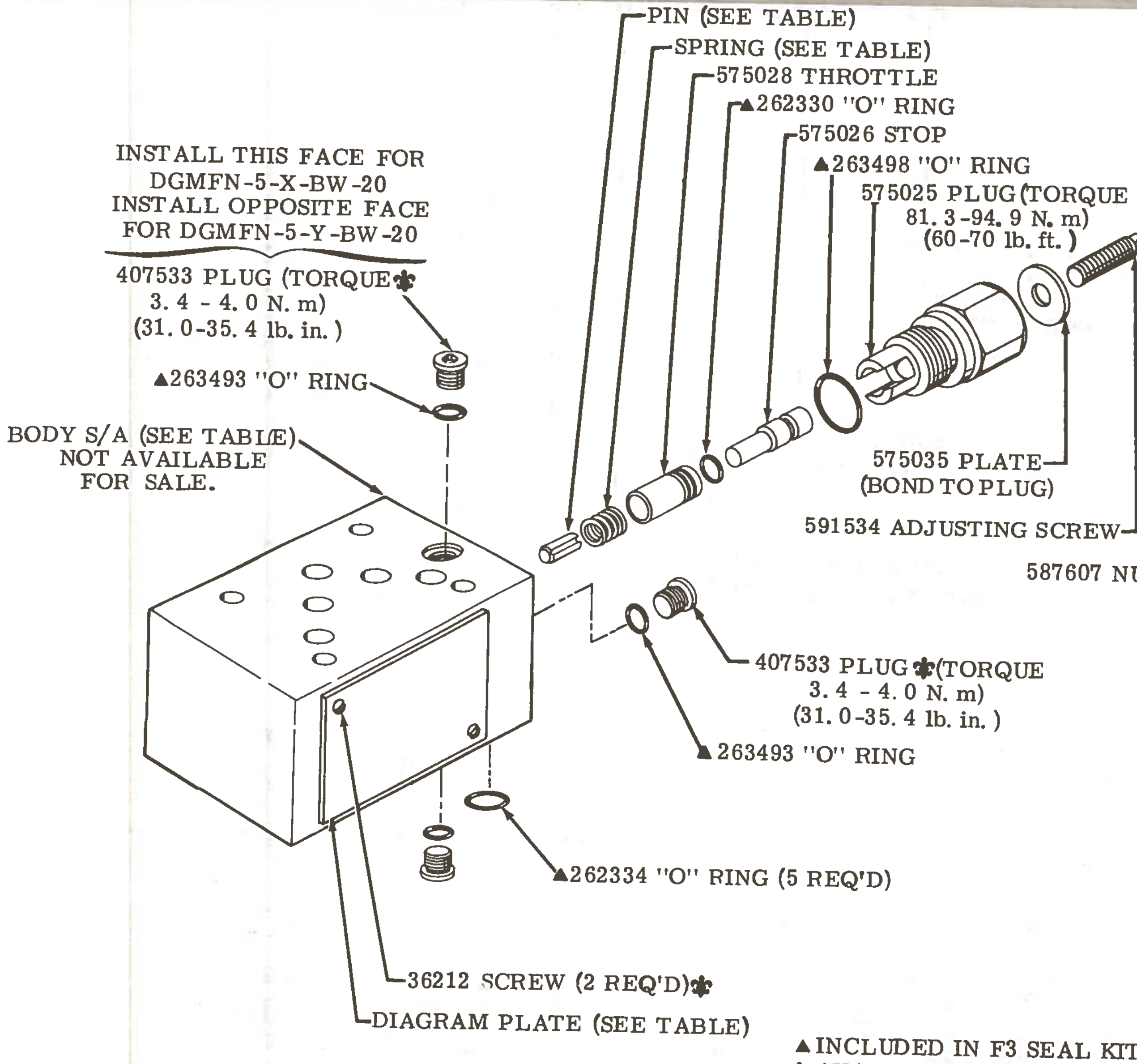
Service Parts Information

VICKERS®
A TRINOVA COMPANY

FLOW CONTROL MODULE

DGMFN-5-Y-*W-20

DGMFN-5-X-*W-20



▲ INCLUDED IN F3 SEAL KIT 920246
✽ AVAILABLE ONLY IN KITS OF 25 EACH
ALL PARTS ARE METRIC

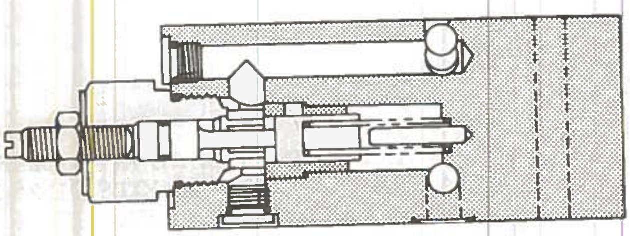
NOTE
DGMFN-5-*-B*-20 MODEL SHOWN. -A*- AND -P*- MODELS HAVE THE PARTS LOCATED AT OPPOSITE END OF BODY. SEE BACK PAGE FOR X-A, X-P AND Y-A ASSEMBLY.

MODEL	BODY S/A	SPRING	DIAGRAM PLATE	PIN
DGMFN-5-X-AW-20	587979	575031	630316	248868
DGMFN-5-X-BW-20	587983		630313	
DGMFN-5-X-PW-20	587985	575032	575034	248874
DGMFN-5-Y-AW-20	587977	575031	630315	248868
DGMFN-5-Y-BW-20	587981		630314	

MODEL CODE BREAKDOWN

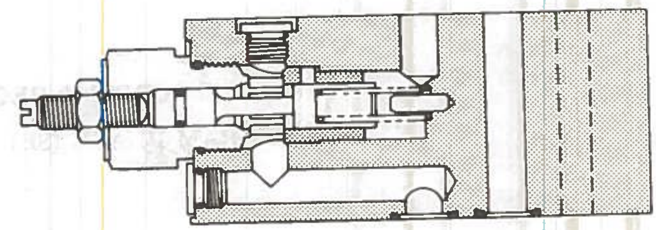
F3 - DGM FN - 5 -*- *W - 20

- **F3** – SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- **DGM** – MODULAR VALVE
- **FN** – FLOW REGULATOR NON-COMPENSATED
- **5** – INTERFACE CETOP-5/ NFPA-D02
- ***** – DIRECTION OF FLOW
  - X - METER IN
  - Y - METER OUT
- ***** – PORT OPERATED UPON
  - A PORT
  - B PORT
  - P PORT
- **W** – ADJUSTMENT MECHANISM STANDARD SLOTTED SCREW AND LOCKNUT
- **20** – DESIGN



DGMFN-5-X-PW-20

DGMFN-5-Y-AW-20



DGMFN-5-X-AW-20

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

PRESSURE RELIEF MODULE

DGMC2-3-AB-*W-BA-*W-31

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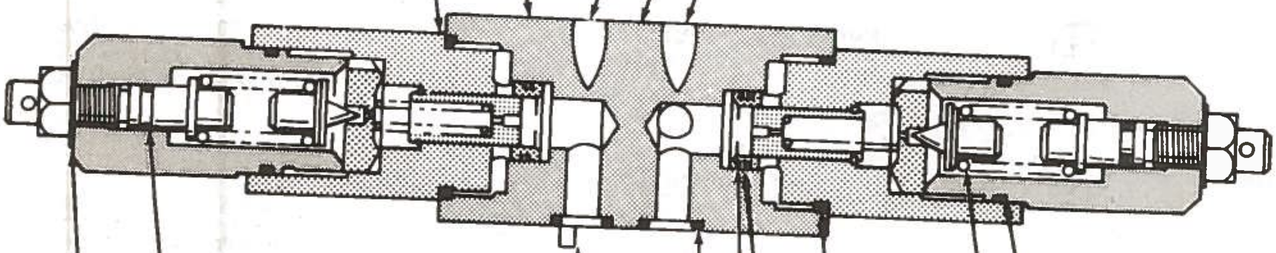
MODEL	SPRING	PRESSURE RELIEF MODULE S/A	PRESSURE RANGE	
			(bar)	(PSI)
DGMC2-3-AB-BW-BA-BW-31	531671	531928	10-70	145-1000
DGMC2-3-AB-CW-BA-CW-31	531672	531529	30-140	435-2000
DGMC2-3-AB-FW-BA-FW-31	531673	531930	50-250	725-3600



▲INCLUDED IN F3 SEAL KIT 920252

MODEL CODE BREAKDOWN

DGM C2 -3- A B -* W -B A -* W -31

1 2 3 4 5 6 7 8 9 10 11 12

1 — Modular Valves

2 — Type of Module
Service Line Relief

3 — Interface
CETOP 3
NFPA-D-01

4 — Port Operated Upon
A Port

5 — Port Drained To
B Port

6 — Pressure Controls
Adjustment Range bars (PSIG)

B – 10 to 70 (145–1000)
C – 30 to 140 (435–2000)
F – 50 to 250 (725–3600)

7 — Adjustment Mechanism
Standard Wrench Adj.

8 — Port Operated Upon
B Port

9 — Port Drained To
A Port

10 — Pressure Controls
Adjustment Range bars (PSIG)

B – 10 to 70 (145–1000)
C – 30 to 140 (435–2000)
F – 50 to 250 (725–3600)

11 — Adjustment Mechanism
Standard Wrench Adj.

12 — Design

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

Litho in U.S.A.

Service Parts Information

WATER OIL COOLERS

OCW-*-*-*-30

VICKERS®
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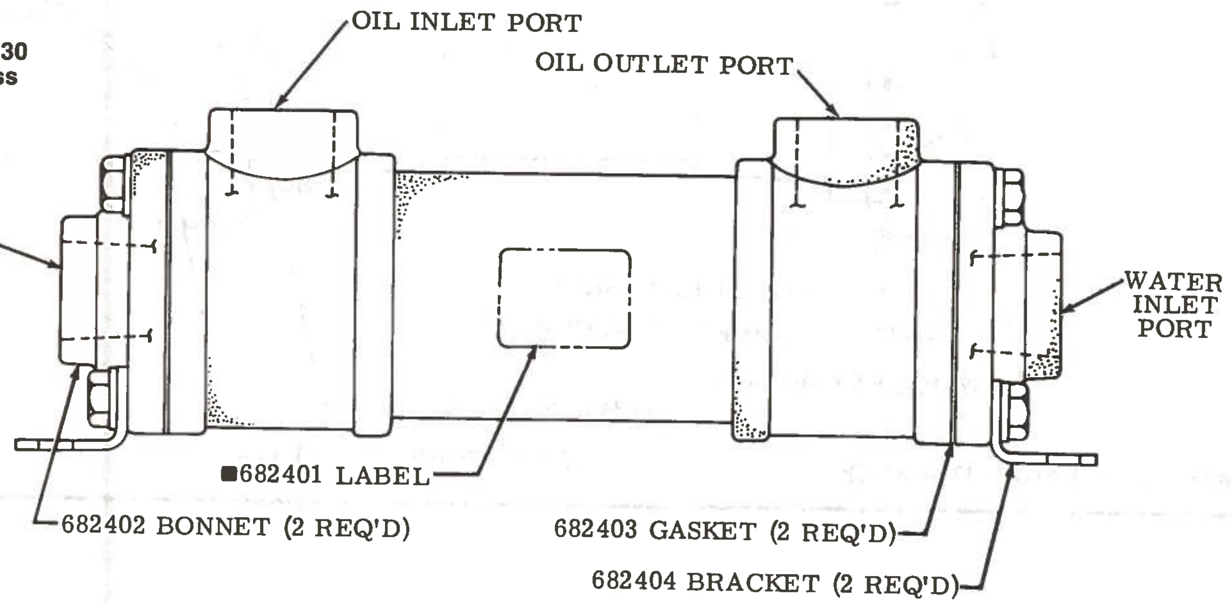
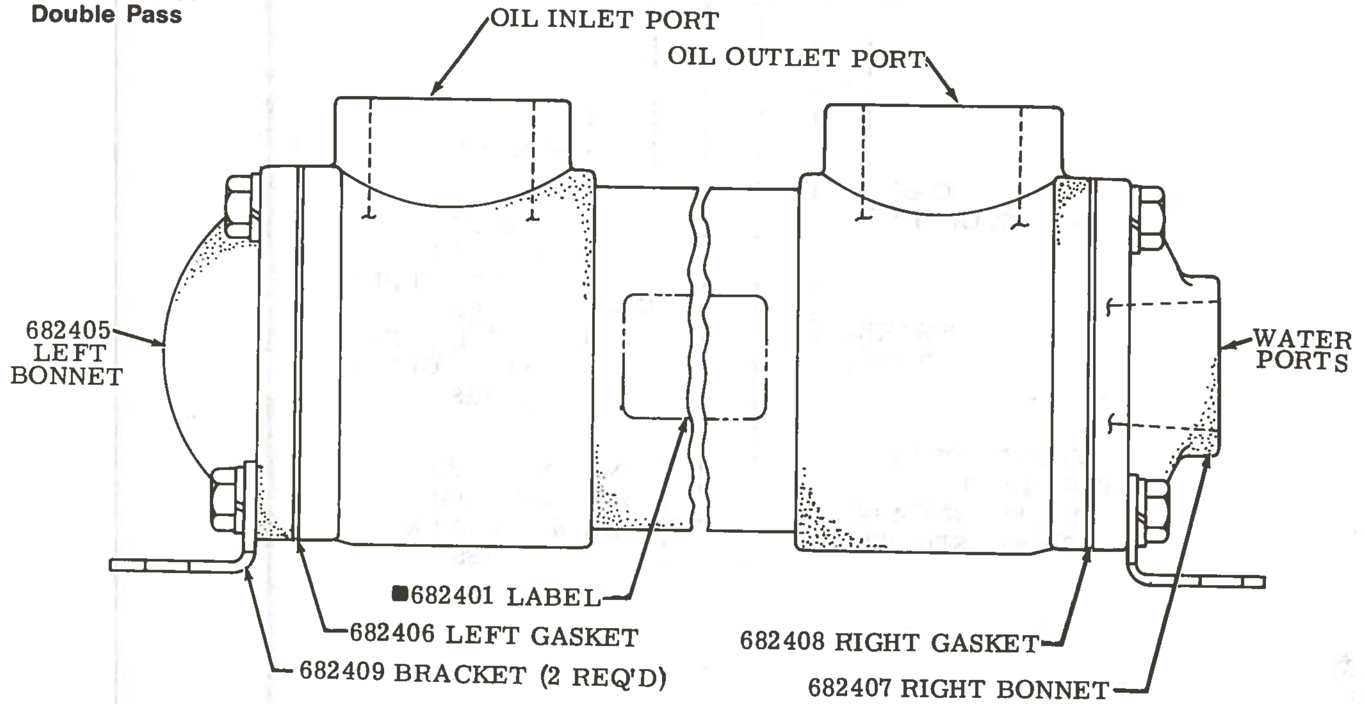
OCW-S-2-F-30
Single Pass



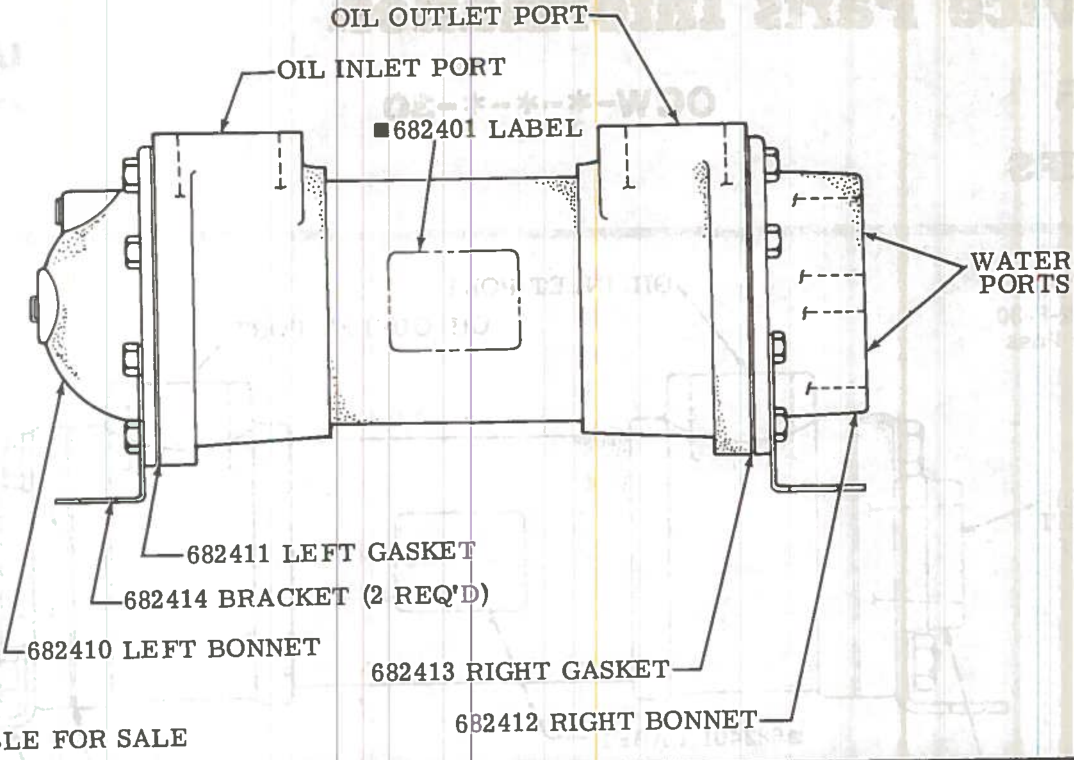
■ NOT AVAILABLE FOR SALE

OCW-S-*-F-30
Double Pass



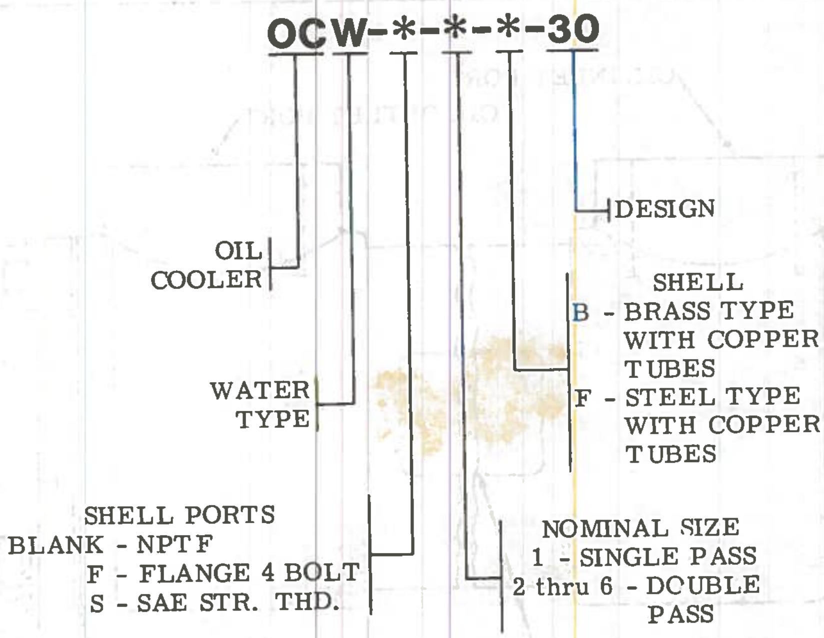
■ NOT AVAILABLE FOR SALE

OCW-F-6-F-30
Double Pass



■NCT AVAILABLE FOR SALE

MODEL CODE BREAKDOWN



Service Parts Information

NON-COMPENSATED FLOW REGULATORS

FN-**-1*
FN-(*)*S-**-1*
FN-**-2*
FN-(*)*S-**-2*

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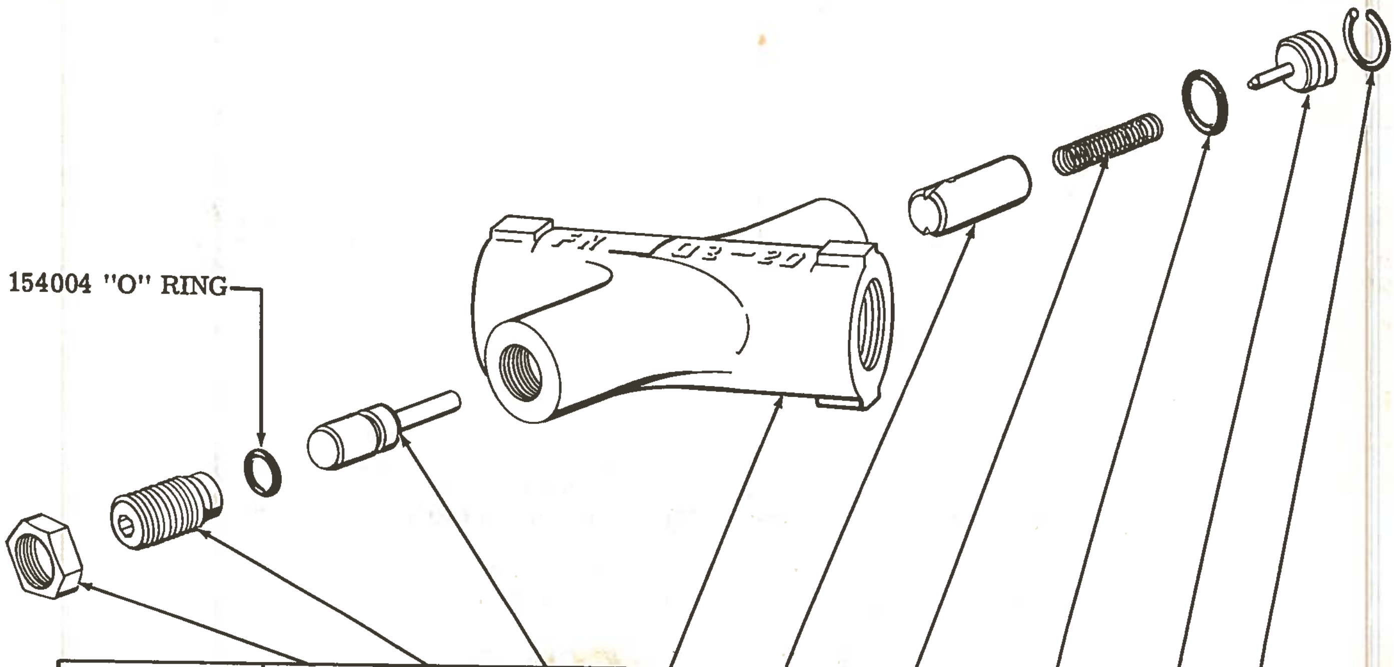

<table>
<tr><th>MODEL</th><th>NUT</th><th>SCREW</th><th>STOP</th><th>BODY</th><th>CHECK VALVE</th><th>SPRING</th><th>"O" RING</th><th>PLUG</th><th>SNAP RING</th></tr>
<tr><td>FN-03-10</td><td rowspan="4">187012</td><td rowspan="4">245454</td><td rowspan="4">226287</td><td>230128</td><td rowspan="4">226288</td><td rowspan="4">241339</td><td rowspan="4">154005</td><td rowspan="4">226289</td><td rowspan="4">233227</td></tr>
<tr><td>FN-8S-03-10</td><td>230129</td></tr>
<tr><td>FN-06-10</td><td>230410</td></tr>
<tr><td>FN-14S-06-10</td><td>230411</td></tr>
<tr><td>FN-10-10</td><td rowspan="10">166886</td><td rowspan="10">253317</td><td rowspan="10">253369</td><td>292759</td><td rowspan="4">292761</td><td rowspan="4">292502</td><td rowspan="4">154009</td><td rowspan="4">292762</td><td rowspan="4">313830</td></tr>
<tr><td>FN-10-11</td><td>382311</td></tr>
<tr><td>FN-20S-10-10</td><td>292760</td></tr>
<tr><td>FN-20S-10-11</td><td>387112</td></tr>
<tr><td>FN-03-20</td><td>253365</td><td rowspan="6">226288</td><td rowspan="6">241339</td><td rowspan="6">154005</td><td rowspan="6">226289</td><td rowspan="6">233227</td></tr>
<tr><td>FN-8S-03-20</td><td>253366</td></tr>
<tr><td>FN-06-20</td><td>253367</td></tr>
<tr><td>FN-06-21</td><td>387118</td></tr>
<tr><td>FN-12S-06-21</td><td>387117</td></tr>
<tr><td>FN-14S-06-20</td><td>253368</td></tr>
</table>

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MODEL CODE BREAKDOWN

FN -(S) - ** - ****

- FN — FLOW REGULATOR
- FN — NON-COMPENSATED
- (**S):
  - 8S = 3/4 IN. - 16 S.A.E. STRAIGHT THREAD FOR 1/2 IN. O.D. TUBING (OMIT FOR PIPE THREAD MODELS)
  - 14S = 1-3/16 IN. - 12 S.A.E. STRAIGHT THREAD FOR 7/8 IN. O.D. TUBING (OMIT FOR PIPE THREAD MODELS)
  - 20S = 1-5/8 IN. - 12 S.A.E. STRAIGHT THREAD FOR 1-1/4 IN. O.D. TUBING (OMIT FOR PIPE THREAD MODELS)
- **:
  - 03 = 3/8 IN. PIPE THREAD
  - 06 = 3/4 IN. PIPE THREAD
  - 10 = 1-1/4 IN. PIPE THREAD
- ** — DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

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Service Parts Information

Hydraulic Remote Control

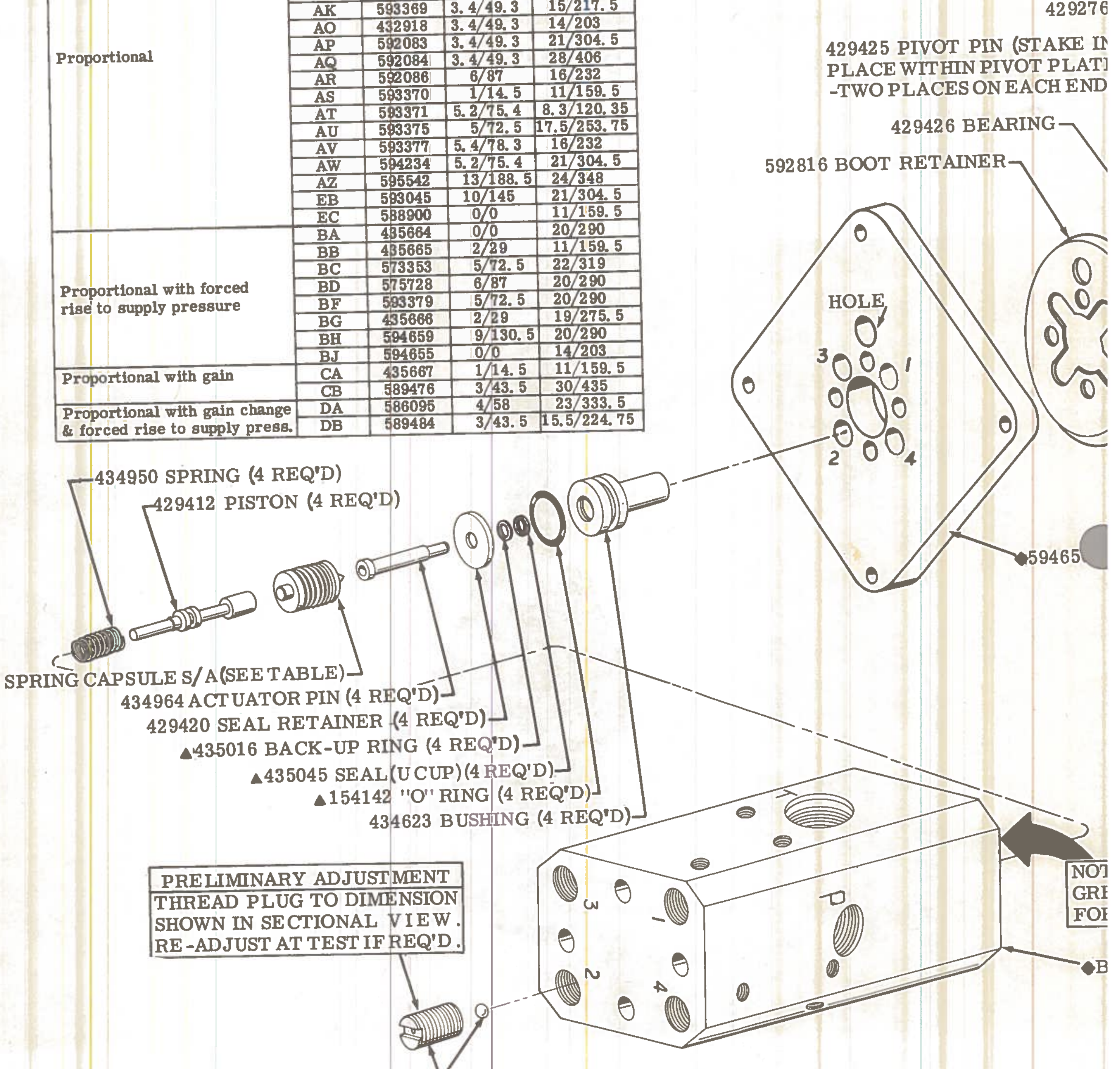
HRC-D-**-**-**-**-*-10

Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

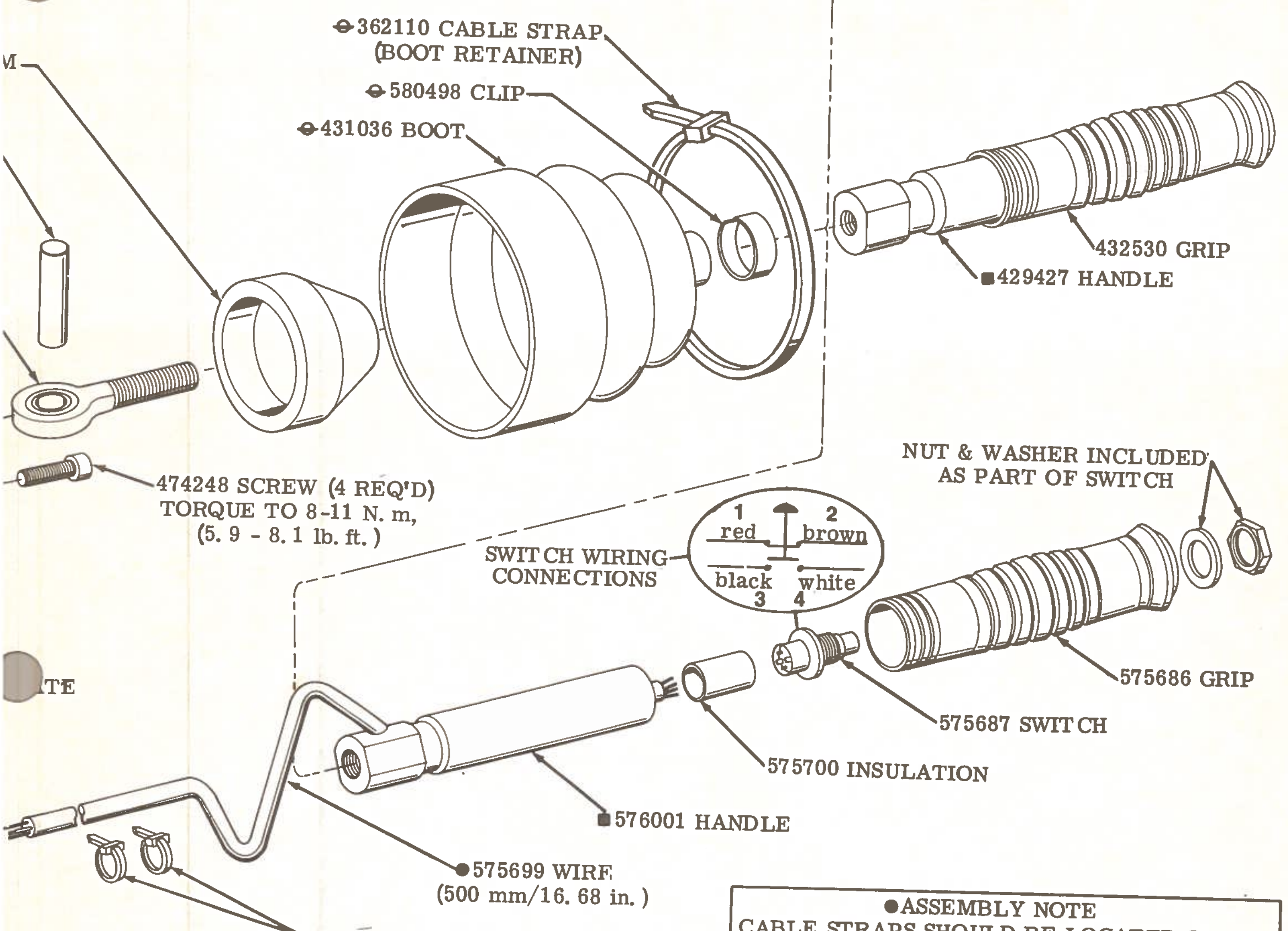
Revised 12-1-87 **M-2441-S**

OUTLET PRESSURE CHARACTERISTIC	SEE MODEL CODE	SPRING CAPSULE SUBASSY	PRESSURE IN bar/PSIG	
			INITIAL	FINAL
Proportional	AA	433705	3.4/49.3	17/246.5
	AB	581351	3.4/49.3	22/319
	AC	573378	6/87	20/290
	AD	585922	3.4/49.3	24/348
	AE	582769	9/130.5	17/246.5
	AF	592078	3.4/49.3	16/232
	AH	432906	5/72.5	15/217.5
	AK	593369	3.4/49.3	15/217.5
	AO	432918	3.4/49.3	14/203
	AP	592083	3.4/49.3	21/304.5
	AQ	592084	3.4/49.3	28/406
	AR	592086	6/87	16/232
	AS	593370	1/14.5	11/159.5
	AT	593371	5.2/75.4	8.3/120.35
	AU	593375	5/72.5	17.5/253.75
	AV	593377	5.4/78.3	16/232
	AW	594234	5.2/75.4	21/304.5
	AZ	595542	13/188.5	24/348
	EB	593045	10/145	21/304.5
	EC	588900	0/0	11/159.5
Proportional with forced rise to supply pressure	BA	435664	0/0	20/290
	BB	435665	2/29	11/159.5
	BC	573353	5/72.5	22/319
	BD	575728	6/87	20/290
	BF	593379	5/72.5	20/290
	BG	435666	2/29	19/275.5
	BH	594659	9/130.5	20/290
	BJ	594655	0/0	14/203
Proportional with gain	CA	435667	1/14.5	11/159.5
	CB	589476	3/43.5	30/435
Proportional with gain change & forced rise to supply press.	DA	586095	4/58	23/333.5
	DB	589484	3/43.5	15.5/224.75



ADJUSTMENT BALL & PLUG S/A	BALL SIZE mm	in
941196 (4 REQ'D)	5.5563 mm/0.21875 in.	

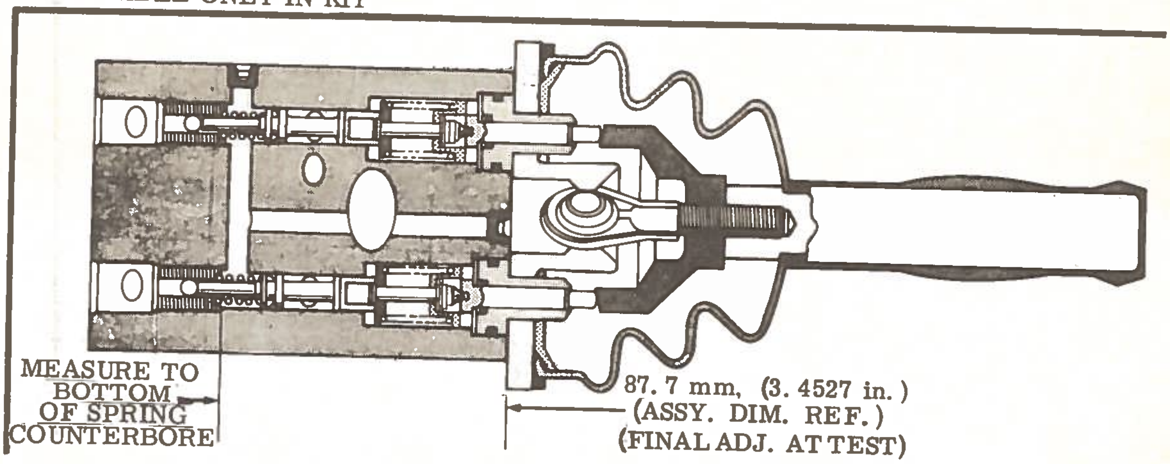
■ NOTE
USE PURPLE LOCKING COMPOUND, LOCTITE 222 OR EQUIVALENT, ON THREADS. ADJUST CAM TO PROVIDE MINIMUM BACKLASH BETWEEN CAM AND ACTUATOR PINS. HOLD CAM AND TORQUE HANDLE TO 23-27 N. m, (16. 9-19. 9 lb. ft.)



● ASSEMBLY NOTE
CABLE STRAPS SHOULD BE LOCATED ON THE WIRE, ABOVE AND BELOW THE THRU HOLE IN THE PIVOT PLATE. BEFORE TIGHTENING CABLE STRAPS IN PLACE, WRAP WIRE AROUND CAM 180° to 360° TO MINIMIZE PRESSURE ON CAM AND BOOT.

▲ INCLUDED IN SEAL KIT 920179
⊖ INCLUDED IN BOOT KIT 941388
◆ NOT AVAILABLE FOR SALE
⊖ AVAILABLE ONLY IN KIT

...LY LIGHT COAT OF ... THIS SURFACE BE- ... OF PIVOT PLATE.



MODEL CODE BREAKDOWN

HRC - D - ** - ** - ** - ** - * - 10

- **HRC** — HYDRAULIC REMOTE CONTROL
- **D** — D - JOYSTICK - LEVER ACTUATION DOUBLE FUNCTION
- ****** (first) — OUTPUT PRESSURE CHARACTERISTICS FOR PORT 1. Example "AA"
- ****** (second) — OUTPUT PRESSURE CHARACTERISTICS FOR PORT 2. Example "AA"
- ****** (third) — OUTPUT PRESSURE CHARACTERISTICS FOR PORT 3. Example "AA"
- ****** (fourth) — OUTPUT PRESSURE CHARACTERISTICS FOR PORT 4. Example "AA"
- ***** — HANDLE & SWITCHES
  - H - STD. HANDLE
  - L - STD. HANDLE W/ PUSHBUTTON SWITCH
  - O - STUB HANDLE
- **10** — DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

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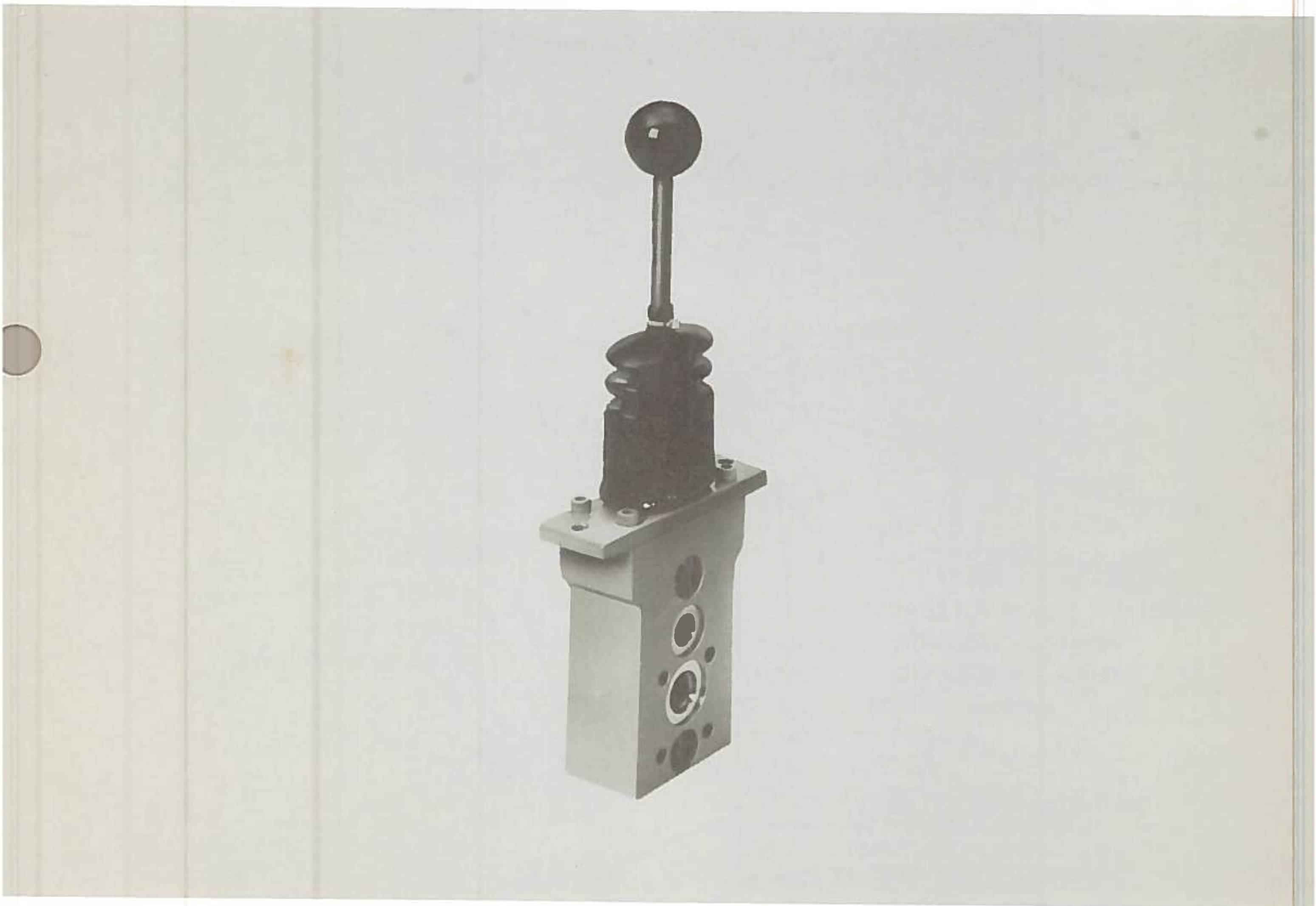
Service Parts Information

Hydraulic Remote Control

HRC-S-* *-* *-H-10



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Revised 12-1-87

M-2442-S

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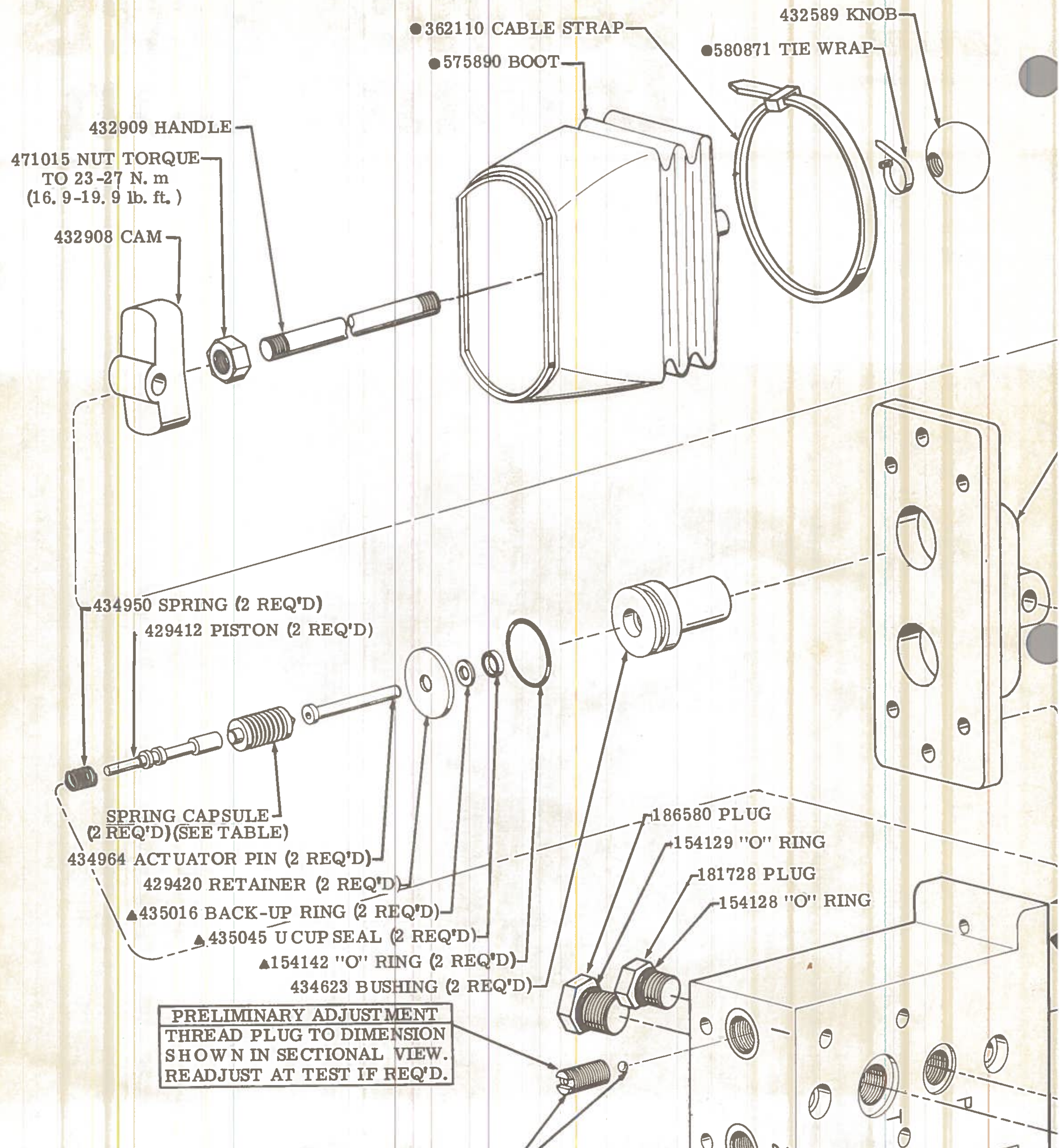


ADJUSTMENT PLUG & BALL S/A	BALL SIZE	
	mm	in.
941196 (2 REQ'D)	5. 5563	0. 21875

CLUDED IN 920183 SEAL KIT
CLUDED IN 941290 BOOT KIT
T AVAILABLE FOR SALE
AILABLE ONLY IN KIT

REFER TO BACK PAGE FOR STUD & NUT KIT

76037 PIVOT PLATE

513770 PIN (STAKE AT ASSEMBLY)

4248 SCREW (4 REQ'D)
ORQUE TO 8-11 N. m
(5. 9 - 8. 1 lb. ft.)

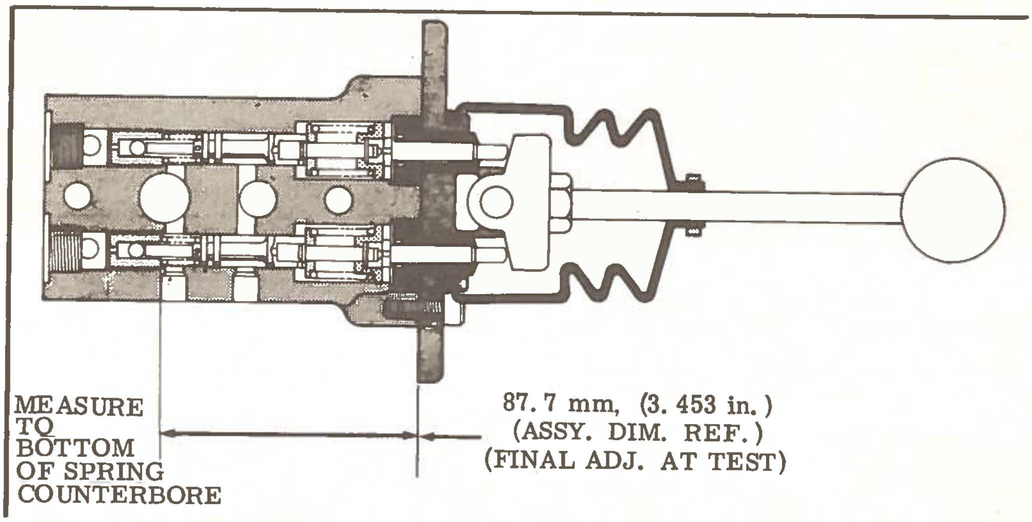
◆BODY

APPLY A LIGHT COAT OF GREASE TO THIS SURFACE BEFORE ASSY OF PIVOT PLATE.

▲199812 "O" RING

▲166772 "O" RING

OUTLET PRESSURE CHARACTERISTIC	MODEL CODE	SPRING CAPSULE S/A	PRESSURE IN bar/PSIG	
			INITIAL	FINAL
Proportional	AA	433705	3. 4/49. 3	17/246. 5
	AB	581351	3. 4/49. 3	22/319
	AC	573378	6/87	20/290
	AD	585922	3. 4/49. 3	24/348
	AE	582769	9/130. 5	17/246. 5
	AF	592078	3. 4/49. 3	16/232
	AH	432906	5/72. 5	15/217. 5
	AJ	633492	3. 4/49. 3	12/174. 0
	AK	593369	3. 4/49. 3	15/217. 5
	AL	631979	3. 0/43. 5	20/290. 0
	AO	432918	3. 4/49. 3	14/203
	AP	592083	3. 4/49. 3	21/304. 5
	AQ	592084	3. 4/49. 3	28/406
	AR	592086	6/87	16/232
	AS	593370	1/14. 5	11/159. 5
	AT	593371	5. 2/75. 4	8. 3/120. 35
	AU	593375	5/72. 5	17. 5/253. 75
	AV	593377	5. 4/78. 3	16/232
	AW	594234	5. 2/75. 4	21/304. 5
	AZ	595542	13/188. 5	24/348
	EA	627849	3. 4/49. 3	19/275. 5
	EB	593045	10/145	21/304. 5
	EC	588900	0/0	11/159. 5
	ED	583833	4. 0/58. 0	21/304. 5
	EG	627882	5. 0/72. 5	14/203. 0
	EH	627881	6. 0/87. 0	9. 0/130. 5
	EK	627879	8/116	19/275. 2
	EL	627884	0/0	12/174. 0
	EM	633496	10. 0/145	26/377. 0
Proportional with forced rise to supply pressure	BA	435664	0/0	20/290
	BB	435665	2/29	11/159. 5
	BC	573353	5/72. 5	22/319
	BD	575728	6/87	20/290
	BF	593379	5/72. 5	20/290
	BG	435666	2/29	19/275. 5
	BH	594659	9/130. 5	20/290
	BJ	594655	0/0	14/203
	BL	576008	0/0	15/217. 5
	BM	632209	0/0	12/174. 0
Proportional with gain	CA	435667	1/14. 5	11/159. 5
	CB	589476	3/43. 5	30/435
	CC	627848	10. 0/145	21/304. 5
	CD	627851	2. 0/29. 0	23/333. 5
Proportional with gain change & forced rise to supply press.	DA	586095	4/58	23/333. 5
	DB	589484	3/43. 5	15. 5/224. 75



MODEL CODE BREAKDOWN

HRC - S - ** - ** - H - 10

- HRC — HYDRAULIC REMOTE CONTROL
- S — S - NO DETENT OPTION LEVER ACTUATION REDUCED SIZE SINGLE FUNCTION
- ** — OUTPUT PRESSURE CHARACTERISTICS FOR PORT 1. Example "AA"
- ** — OUTPUT PRESSURE CHARACTERISTICS FOR PORT 2. Example "AA"
- H — HANDLE
  - H - STD HANDLE
  - O - NO HANDLE
- 10 — DESIGN

MODEL	HRC-S-P*-10 STUD & NUT KIT			
	NO. OF SECTIONS	ASS'Y NO.	STUD (2 REQ'D)	NUT (4 REQ'D)
HRC-S-P2-10	2	586088	578511	471014
HRC-S-P3-10	3	586089	578512	
HRC-S-P4-10	4	586090	578513	
HRC-S-P5-10	5	586091	578514	
HRC-S-P6-10	6	586092	578515	
HRC-S-P7-10	7	588890	578516	
HRC-S-P8-10	8	588891	578517	
HRC-S-P9-10	9	588892	578518	
HRC-S-P10-10	10	588893	578519	

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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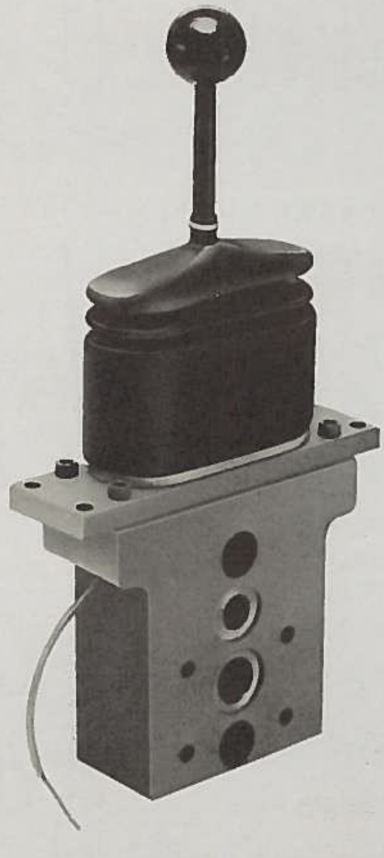
Service Parts Information

Hydraulic Remote Control

HRC-M-***-***-H-10



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 12-1-87 M-2443-S

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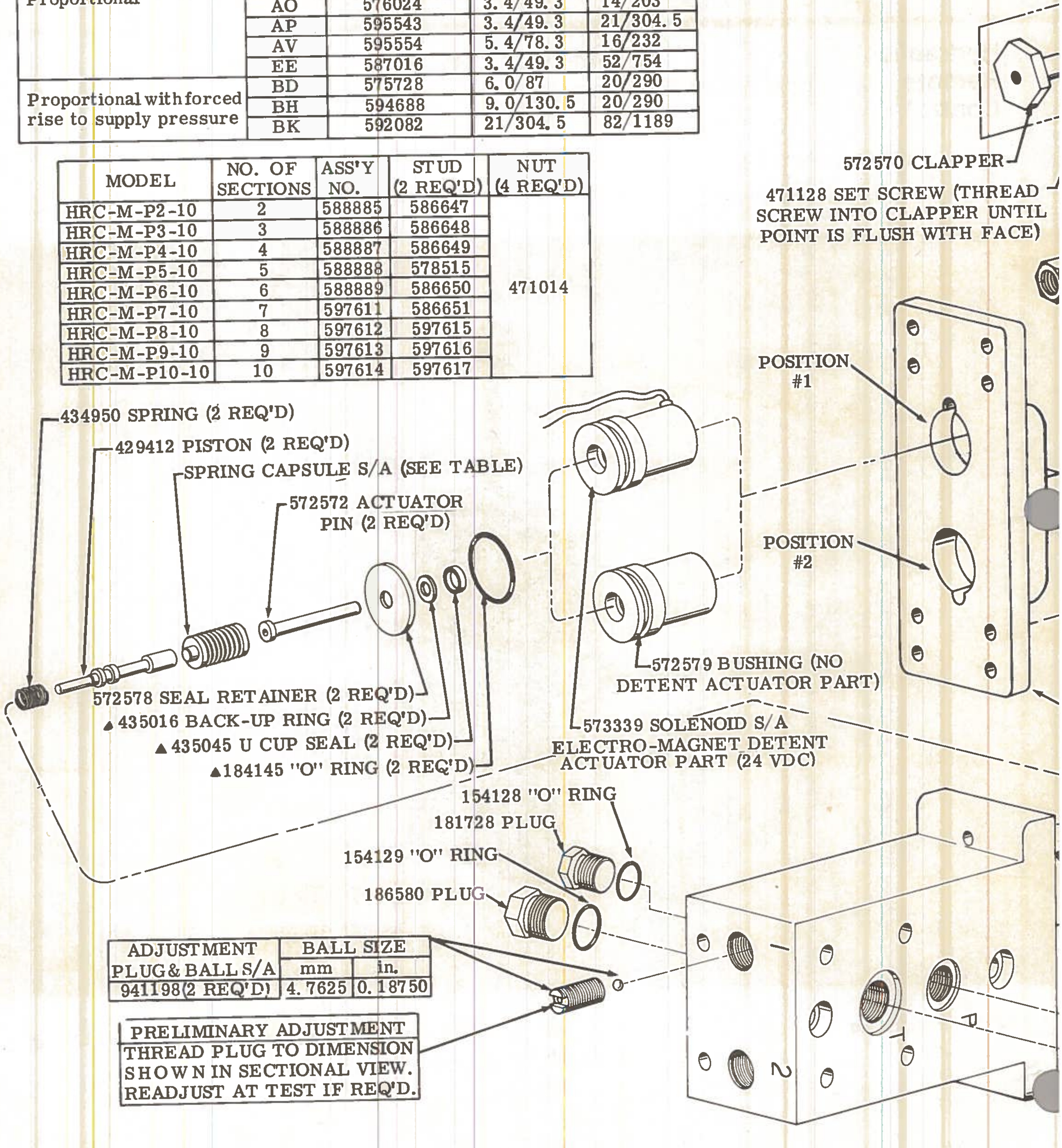
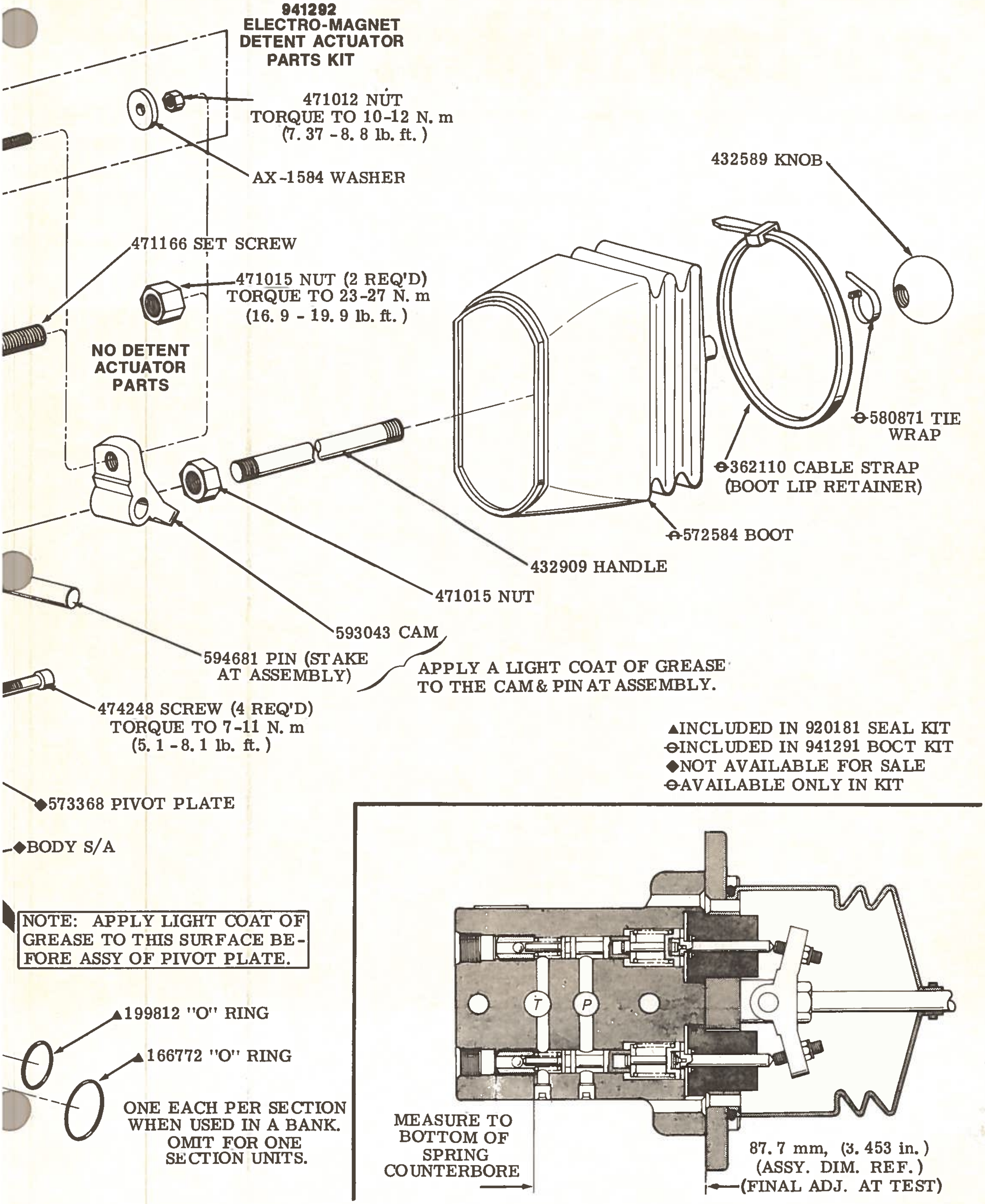
OUTPUT PRESSURE CHARACTERISTIC	MODEL CODE	SPRING CAPSULE S/A	PRESS. IN bar/PSI INITIAL	FINAL
Proportional	AC	590806	6.0/87	20/290
	AE	583834	9.0/130.5	17/246.5
	AF	628569	3.4/49.3	16/232
	AN	588866	3.4/49.3	103/1493.5
	AO	576024	3.4/49.3	14/203
	AP	595543	3.4/49.3	21/304.5
	AV	595554	5.4/78.3	16/232
	EE	587016	3.4/49.3	52/754
Proportional with forced rise to supply pressure	BD	575728	6.0/87	20/290
	BH	594688	9.0/130.5	20/290
	BK	592082	21/304.5	82/1189

MODEL	NO. OF SECTIONS	ASS'Y NO.	STUD (2 REQ'D)	NUT (4 REQ'D)
HRC-M-P2-10	2	588885	586647	471014
HRC-M-P3-10	3	588886	586648	
HRC-M-P4-10	4	588887	586649	
HRC-M-P5-10	5	588888	578515	
HRC-M-P6-10	6	588889	586650	
HRC-M-P7-10	7	597611	586651	
HRC-M-P8-10	8	597612	597615	
HRC-M-P9-10	9	597613	597616	
HRC-M-P10-10	10	597614	597617	



ADJUSTMENT PLUG & BALL S/A	BALL SIZE mm	in.
941198 (2 REQ'D)	4.7625	0.18750

PRELIMINARY ADJUSTMENT
THREAD PLUG TO DIMENSION SHOWN IN SECTIONAL VIEW. READJUST AT TEST IF REQ'D.



941292
ELECTRO-MAGNET
DETENT ACTUATOR
PARTS KIT
471012 NUT
TORQUE TO 10-12 N. m
(7. 37 - 8. 8 lb. ft.)
AX-1584 WASHER
432589 KNOB
471166 SET SCREW
471015 NUT (2 REQ'D)
TORQUE TO 23-27 N. m
(16. 9 - 19. 9 lb. ft.)
NO DETENT
ACTUATOR
PARTS
⊖580871 TIE
WRAP
⊖362110 CABLE STRAP
(BOOT LIP RETAINER)
⊖572584 BOOT
432909 HANDLE
471015 NUT
593043 CAM
594681 PIN (STAKE
AT ASSEMBLY)
APPLY A LIGHT COAT OF GREASE
TO THE CAM & PIN AT ASSEMBLY.
474248 SCREW (4 REQ'D)
TORQUE TO 7-11 N. m
(5. 1 - 8. 1 lb. ft.)
▲INCLUDED IN 920181 SEAL KIT
⊖INCLUDED IN 941291 BOOT KIT
◆NOT AVAILABLE FOR SALE
⊖AVAILABLE ONLY IN KIT
◆573368 PIVOT PLATE
◆BODY S/A
NOTE: APPLY LIGHT COAT OF
GREASE TO THIS SURFACE BE-
FORE ASSY OF PIVOT PLATE.
▲199812 "O" RING
▲166772 "O" RING
ONE EACH PER SECTION
WHEN USED IN A BANK.
OMIT FOR ONE
SECTION UNITS.
T
P
MEASURE TO
BOTTOM OF
SPRING
COUNTERBORE
87. 7 mm, (3. 453 in.)
(ASSY. DIM. REF.)
(FINAL ADJ. AT TEST)

MODEL CODE BREAKDOWN

HRC - M - ** * - ** * - H - 10

- **HRC** — HYDRAULIC REMOTE CONTROL
- **M** — M - WITH DETENT OPTION LEVER ACTUATION SINGLE FUNCTION
- ****** — OUTPUT PRESSURE CHARACTERISTICS FOR PORT 1. Example "AA"
- ***** — DETENT
  - 0 - NO DETENT
  - 1 - 12 VDC ELECTRO MAGNETIC DETENT
  - 2 - 24 VDC ELECTRO MAGNETIC DETENT
- ****** — OUTPUT PRESSURE CHARACTERISTICS FOR PORT 2. Example "AA"
- ***** — DETENT
  - 0 - NO DETENT
  - 1 - 12 VDC ELECTRO MAGNETIC DETENT
  - 2 - 24 VDC ELECTRO MAGNETIC DETENT
- **H** — HANDLE
  - H - STD. HANDLE
  - O - NO HANDLE
- **10** — DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

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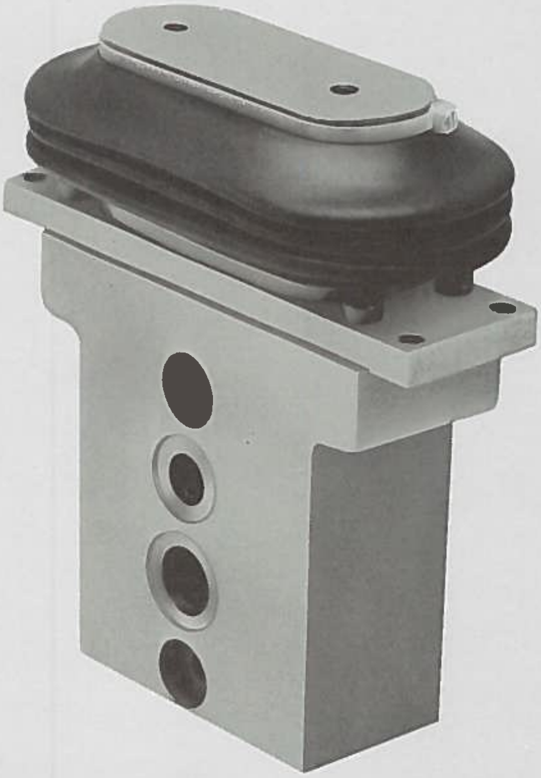
Service Parts Information

Hydraulic Remote Control

HRC-F-* *-* *-10



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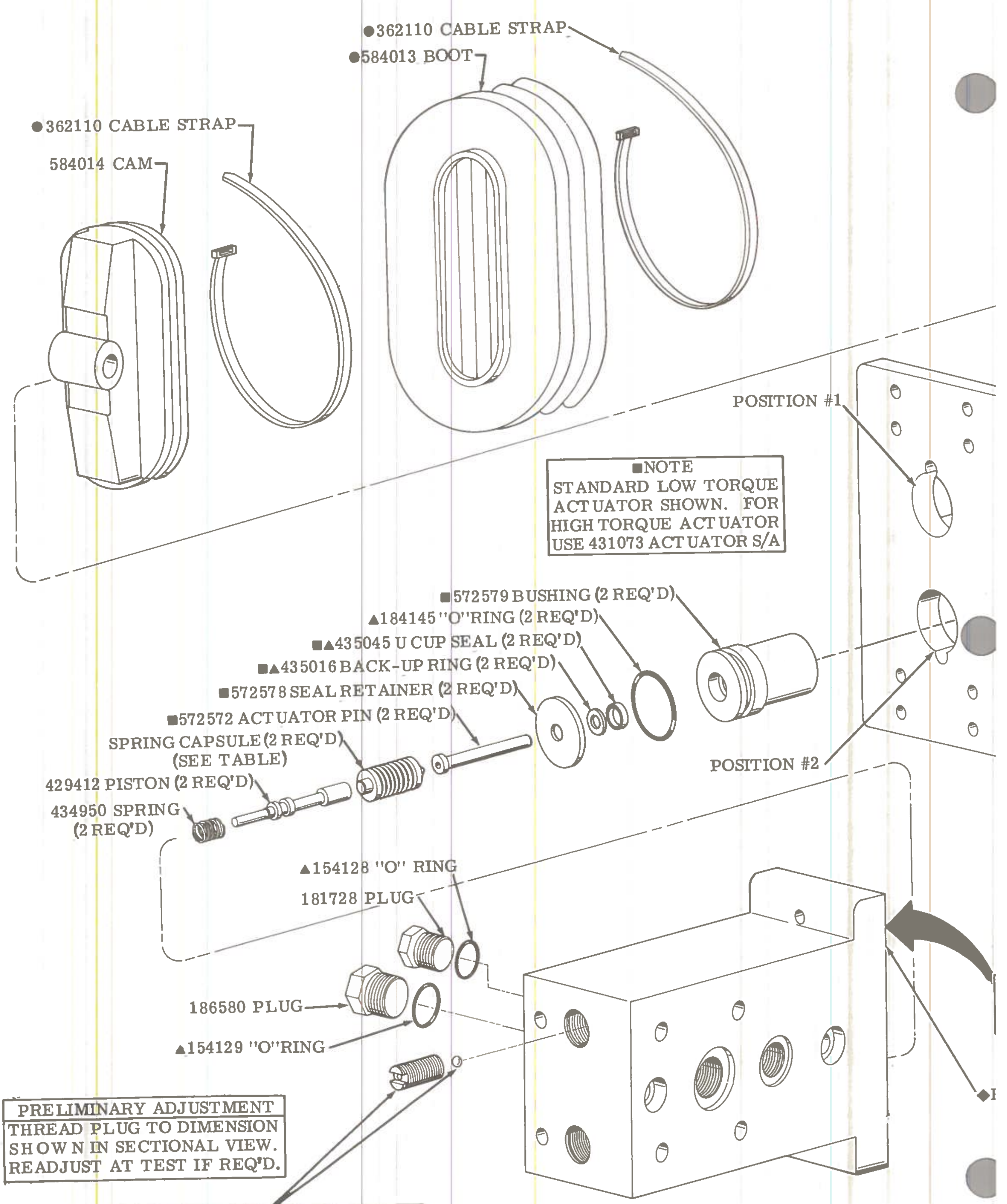
P.O. Box 302
Troy, Michigan 48007-0302

Revised 12-1-87 **M-2444-S**



ADJUSTMENT PLUG & BALL S/A	BALL SIZE	
	mm	in.
941196 (2 REQ'D)	5.5563	0.2188

INCLUDED IN 920224 SEAL KIT
INCLUDED IN 941310 BOOT KIT
NOT AVAILABLE FOR SALE
AVAILABLE ONLY IN KIT

594681 PIN (STAKE IN PLACE AT ASS'Y).

474248 SCREW (4 REQ'D)
TORQUE TO 7-11 N. m
(5. 1 - 8. 1 lb. ft.)

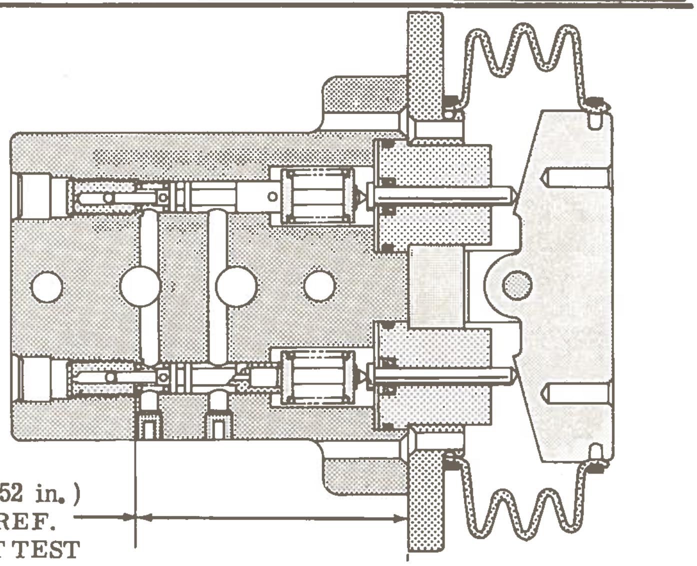
◆ 573368 PIVOT PLATE

: APPLY LIGHT COAT OF
SE TO THIS SURFACE BE-
ASSY OF PIVOT PLATE.

S/A

OUTLET PRESSURE CHARACTERISTIC	MODEL CODE	SPRING CAPSULE S/A	PRESSURE IN bar/PSIG	
			INITIAL	FINAL
Proportional	AA	433705	3. 4/49. 3	17/246. 5
	AB	581351	3. 4/49. 3	22/319
	AC	573378	6/87	20/290
	AD	585922	3. 4/49. 3	24/348
	AE	582769	9/130. 5	17/246. 5
	AF	592078	3. 4/49. 3	16/232
	AH	432906	5/72. 5	15/217. 5
	AJ	633492	3. 4/49. 3	12/174. 0
	AK	593369	3. 4/49. 3	15/217. 5
	AL	631979	3. 0/43. 5	20/290. 0
	AO	432918	3. 4/49. 3	14/203
	AP	592083	3. 4/49. 3	21/304. 5
	AQ	592084	3. 4/49. 3	28/406
	AR	592086	6/87	16/232
	AS	593370	1/14. 5	11/159. 5
	AT	593371	5. 2/75. 4	8. 3/120. 35
	AU	593375	5/72. 5	17. 5/253. 75
	AV	593377	5. 4/78. 3	16/232
	AW	594234	5. 2/75. 4	21/304. 5
	AZ	595542	13/188. 5	24/348
	EA	627849	3. 4/49. 3	19/275. 5
	EB	593045	10/145	21/304. 5
	EC	588900	0/0	11/159. 5
	ED	583833	4. 0/58. 0	21/304. 5
	EG	627882	5. 0/72. 5	14/203. 0
	EH	627881	6. 0/87. 0	9. 0/130. 5
	EK	627879	0/0	19/275. 2
	EL	627884	0/0	12/174. 0
	EM	633496	10. 0/145	26/377. 0
Proportional with forced rise to supply pressure	BA	435664	0/0	20/290
	BB	435665	2/29	11/159. 5
	BC	573353	5/72. 5	22/319
	BD	575728	6/87	20/290
	BF	593379	5/72. 5	20/290
	BG	435666	2/29	19/275. 5
	BH	594659	9/130. 5	20/290
	BJ	594655	0/0	14/203
	BL	576008	0/0	15/217. 5
	BM	632209	0/0	12/174. 0
Proportional with gain	CA	435667	1/14. 5	11/159. 5
	CB	589476	3/43. 5	30/435
	CC	627848	10. 0/145	21/304. 5
	CD	627851	2. 0/29. 0	23/333. 5
Proportional with gain change & forced rise to supply press.	DA	586095	4/58	23/333. 5
	DB	589484	3/43. 5	15. 5/224. 75

MEASURE TO BOTTOM OF SPRING COUNTERBORE



87. 7 mm (3. 452 in.)
(ASS'Y DIM. REF.
FINAL ADJ AT TEST

MODEL CODE BREAKDOWN

HRC - F - ** - ** * - 10

- HRC — HYDRAULIC REMOTE CONTROL
- F — FOOT OPERATED
- ** — OUTPUT PRESSURE CHARACTERISTICS FOR PORT 1. Example "AA"
- ** — OUTPUT PRESSURE CHARACTERISTICS FOR PORT 2. Example "AA".
- * — A - PEDAL MOUNTING HIGH TORQUE; B - PEDAL MOUNTING LOW TORQUE
- 10 — DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

PRESSURE CONTROL VALVES

R(C)G-03-**-30

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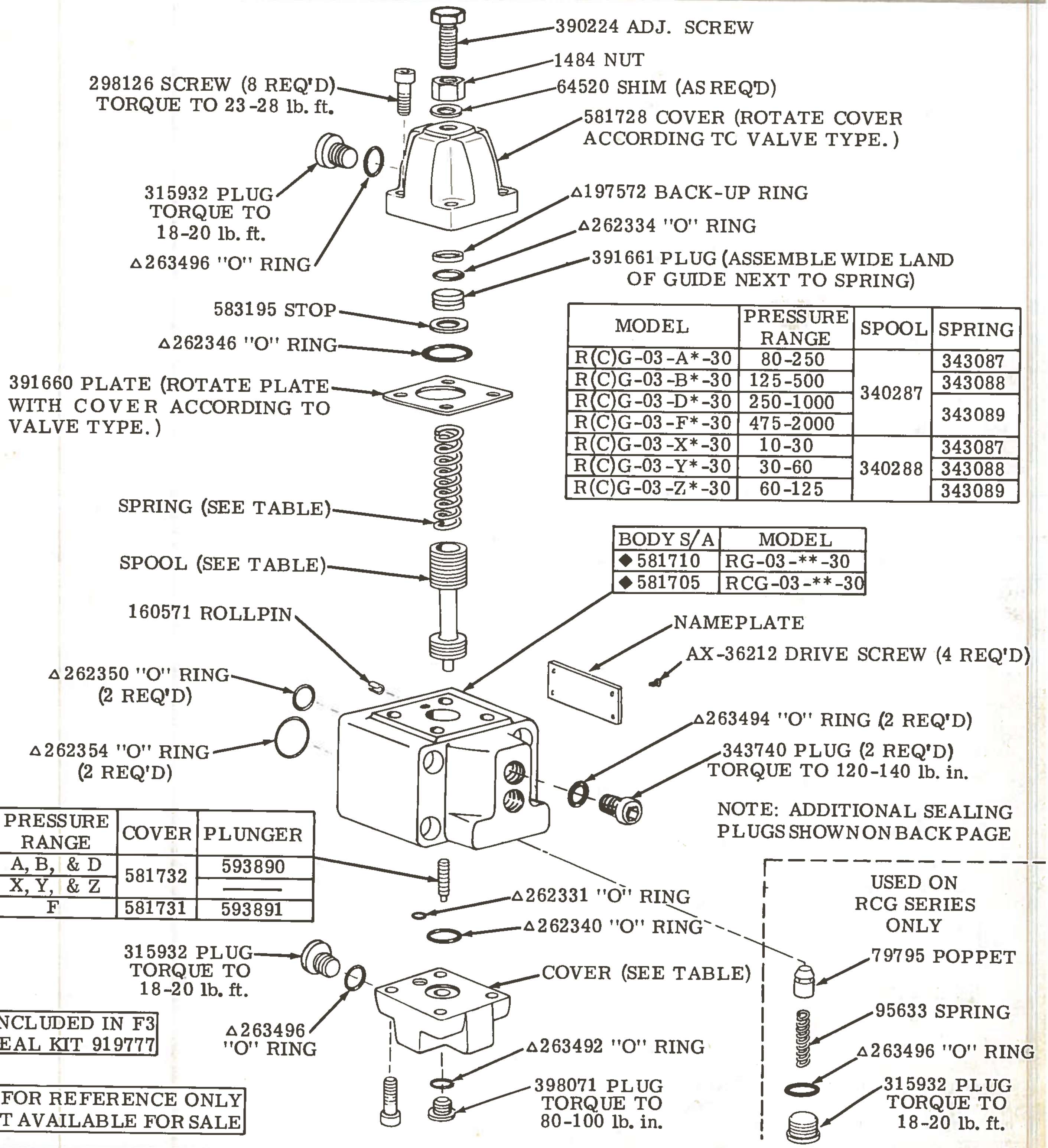


MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)G-03-A*-30	80-250	340287	343087
R(C)G-03-B*-30	125-500		343088
R(C)G-03-D*-30	250-1000		343089
R(C)G-03-F*-30	475-2000		
R(C)G-03-X*-30	10-30	340288	343087
R(C)G-03-Y*-30	30-60		343088
R(C)G-03-Z*-30	60-125		343089

BODY S/A	MODEL
◆581710	RG-03-**-30
◆581705	RCG-03-**-30

PRESSURE RANGE	COVER	PLUNGER
A, B, & D	581732	593890
X, Y, & Z		———
F	581731	593891

△INCLUDED IN F3 SEAL KIT 919777

◆FOR REFERENCE ONLY NOT AVAILABLE FOR SALE

MODEL CODE BREAKDOWN

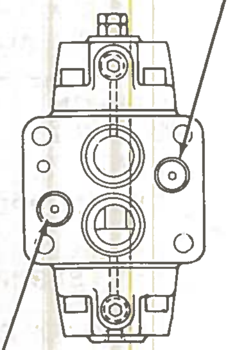
(F3)- R (C) G - 03 - * * - 30

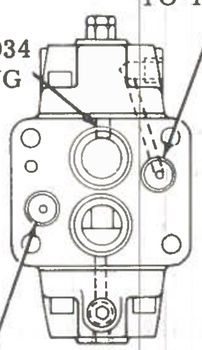
- (F3) — SPECIAL SEALS (OMIT ON STD. MODELS)
- R — PRESSURE CONTROL VALVE
- (C) — "C" - WITH INTEGRAL CHECK VALVE (REVERSE FREE FLOW)
  OMITTED - WITHOUT CHECK VALVE
- G — MOUNTING MANIFOLD OR SUBPLATE
- 03 — NOMINAL VALVE SIZE
  03 - 3/8"
- * — PRESSURE RANGE
  A - 250 PSI MAX.
  B - 500 PSI MAX.
  D - 1000 PSI MAX.
  F - 2000 PSI MAX.
  X - 30 PSI MAX.
  Y - 60 PSI MAX.
  Z - 125 PSI MAX.
- * — VALVE TYPES (INSET VIEWS AT BOTTOM OF PAGE SHOW COVER POSITIONS FOR THE (4) VALVE TYPES)
- 30 — DESIGN

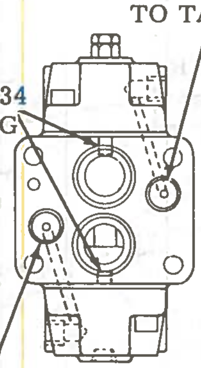
TYPICAL MODEL NUMBER
RCG-03-D4-30

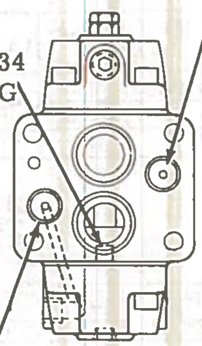
NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RG SERIES - BACK PRESSURE VALVE RCG SERIES - COUNTERBALANCE VALVE	RG OR RCG SERIES- SEQUENCE VALVES	RG OR RCG SERIES- SEQUENCE VALVES	RG SERIES- UNLOADING VALVE RCG SERIES- COUNTERBALANCE VALVE
DIRECTLY CONTROLLED INTERNAL DRAIN	DIRECTLY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED INTERNAL DRAIN









For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

VICKERS®
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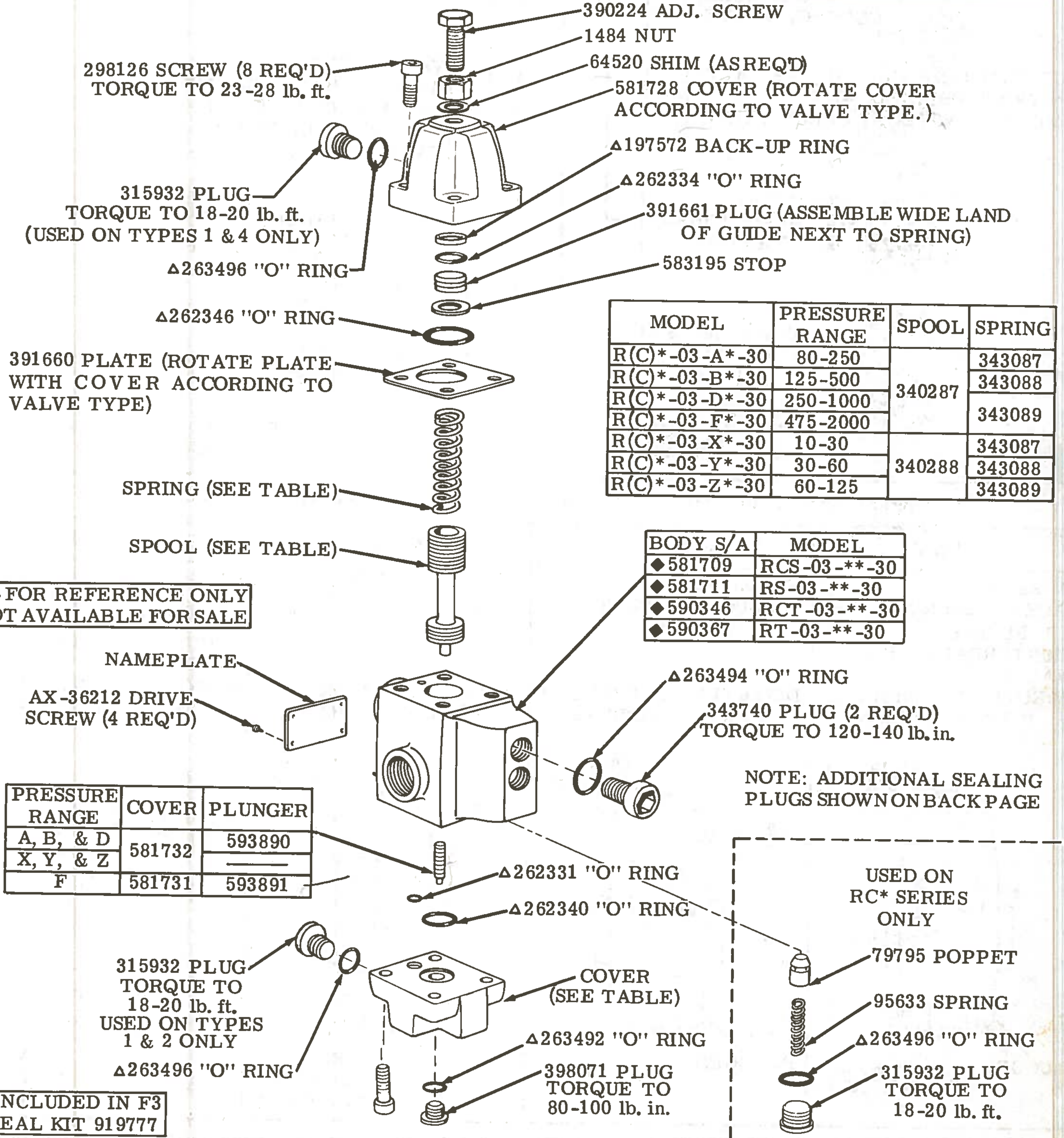
PRESSURE CONTROL VALVES

R(C)T-03-* *-30

R(C)S-03-* *-30



MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)*-03-A*-30	80-250	340287	343087
R(C)*-03-B*-30	125-500		343088
R(C)*-03-D*-30	250-1000		343089
R(C)*-03-F*-30	475-2000		
R(C)*-03-X*-30	10-30	340288	343087
R(C)*-03-Y*-30	30-60		343088
R(C)*-03-Z*-30	60-125		343089

BODY S/A	MODEL
◆581709	RCS-03-**-30
◆581711	RS-03-**-30
◆590346	RCT-03-**-30
◆590367	RT-03-**-30

◆ FOR REFERENCE ONLY NOT AVAILABLE FOR SALE

PRESSURE RANGE	COVER	PLUNGER
A, B, & D	581732	593890
X, Y, & Z		————
F	581731	593891

NOTE: ADDITIONAL SEALING PLUGS SHOWN ON BACK PAGE

△ INCLUDED IN F3 SEAL KIT 919777

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

F3-R (C) * - 03 - * * - 30

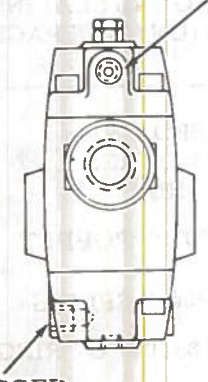
- **F3** — SPECIAL SEALS
- **R** — PRESSURE CONTROL VALVE
- **(C)** — "C" - WITH INTEGRAL CHECK VALVE (REVERSE FREE FLOW); OMITTED - WITHOUT CHECK VALVE
- ***** — MOUNTING
  - S - .750-16 UNF-2B THREAD
  - T - 3/8" NPTF THREAD
- **03** — CONNECTION SIZE
  - 03 - 3/8"
- ***** — PRESSURE RANGE
  - A - 80 - 250 PSI
  - B - 125 - 500 PSI
  - D - 250 - 1000 PSI
  - F - 475 - 2000 PSI
  - X - 10 - 30 PSI
  - Y - 30 - 60 PSI
  - Z - 60 - 125 PSI
- ***** — VALVE TYPES (INSET VIEWS AT BOTTOM OF PAGE SHOW COVER POSITIONS FOR THE (4) VALVE TYPES)
- **30** — DESIGN

TYPICAL MODEL NUMBER
RCT-03-D4-30

NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1

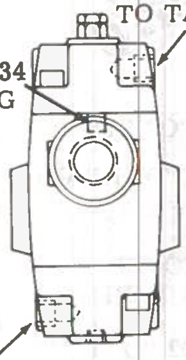
RT SERIES
BACK PRESSURE VALVE
RCT SERIES-
COUNTERBALANCE
VALVE
DIRECTLY CONTROLLED
INTERNAL DRAIN



TYPE 2

RT OR RCT SERIES-
SEQUENCE VALVES

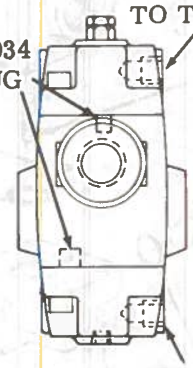
DIRECTLY CONTROLLED
EXTERNAL DRAIN



TYPE 3

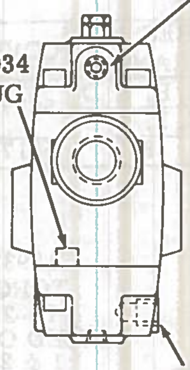
RT OR RCT SERIES-
SEQUENCE VALVES

REMOTELY CONTROLLED
EXTERNAL DRAIN



TYPE 4

RT SERIES-
UNLOADING VALVE
RCT SERIES-
COUNTERBALANCE
VALVE
REMOTELY CONTROLLED
INTERNAL DRAIN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

VICKERS®
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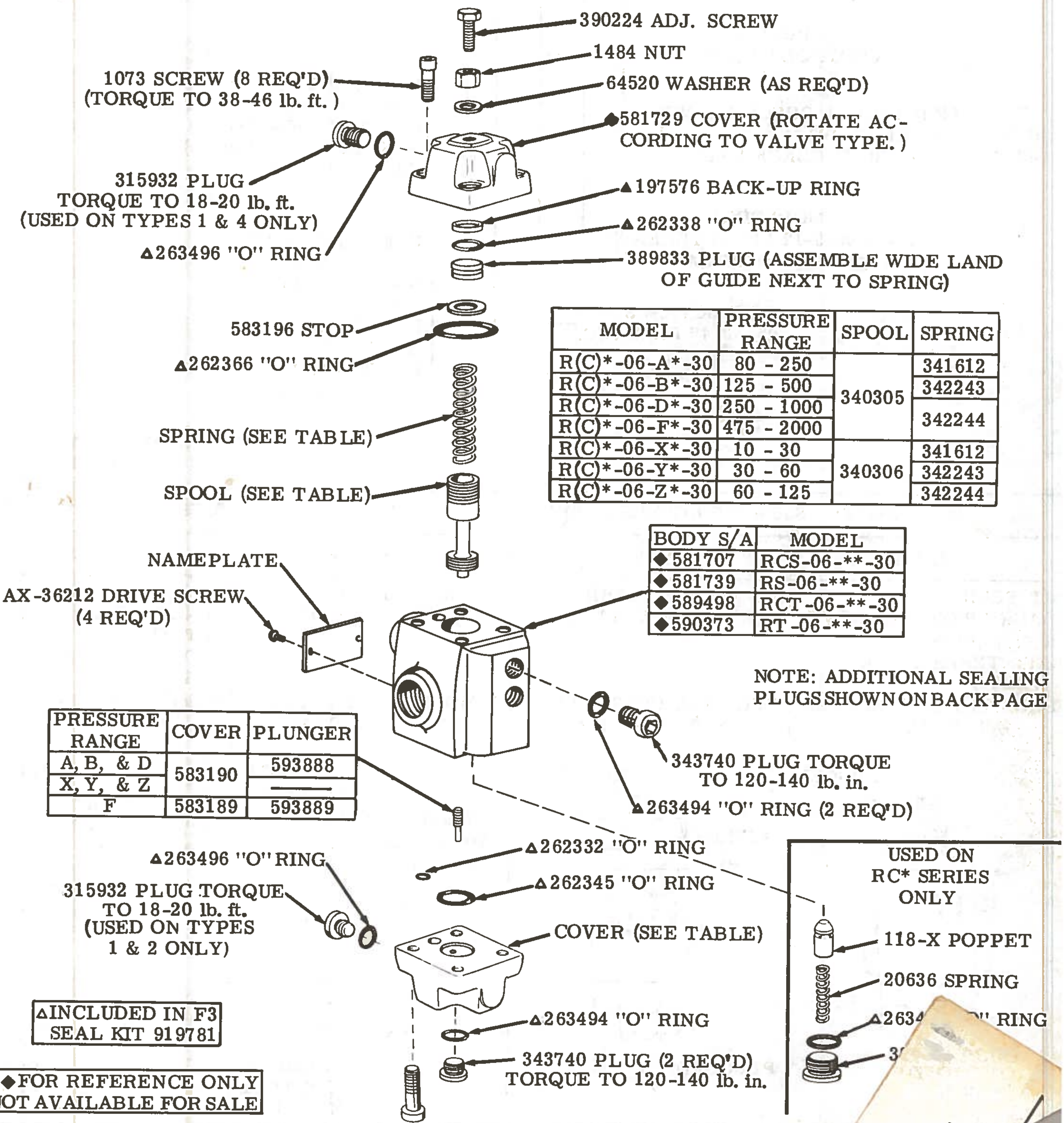
PRESSURE CONTROL VALVES

R(C)T-06-**-30

R(C)S-06-**-30



MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)*-06-A*-30	80 - 250	340305	341612
R(C)*-06-B*-30	125 - 500		342243
R(C)*-06-D*-30	250 - 1000		342244
R(C)*-06-F*-30	475 - 2000		
R(C)*-06-X*-30	10 - 30	340306	341612
R(C)*-06-Y*-30	30 - 60		342243
R(C)*-06-Z*-30	60 - 125		342244

BODY S/A	MODEL
◆ 581707	RCS-06-**-30
◆ 581739	RS-06-**-30
◆ 589498	RCT-06-**-30
◆ 590373	RT-06-**-30

NOTE: ADDITIONAL SEALING PLUGS SHOWN ON BACK PAGE

PRESSURE RANGE	COVER	PLUNGER
A, B, & D	583190	593888
X, Y, & Z		———
F	583189	593889

▵INCLUDED IN F3 SEAL KIT 919781

◆FOR REFERENCE ONLY NOT AVAILABLE FOR SALE

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 7-1-85

MODEL CODE BREAKDOWN

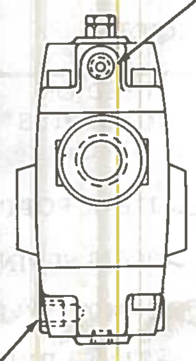
F3 - R (C) * - 06 - * * - 30

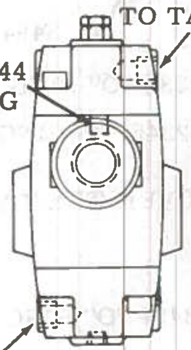
- F3 — SPECIAL SEALS
- R — PRESSURE CONTROL VALVE
- (C) — "C" - WITH INTEGRAL CHECK VALVE (REVERSE FREE FLOW); OMITTED - WITHOUT CHECK VALVE
- * — MOUNTING
  - S - 1.0625-12 UN-2B THREAD
  - T - 3/4 " NPTF THREAD
- 06 — CONNECTION SIZE: 06 - 3/4" PIPE THD.
- * — PRESSURE RANGE
  - A - 80 - 250 PSI
  - B - 125 - 500 PSI
  - D - 250 - 1000 PSI
  - F - 475 - 2000 PSI
  - X - 10 - 30 PSI
  - Y - 30 - 60 PSI
  - Z - 60 - 125 PSI
- * — VALVE TYPES (INSET VIEWS AT BOTTOM OF PAGE SHOW COVER POSITIONS FOR THE (4) VALVE TYPES)
- 30 — DESIGN

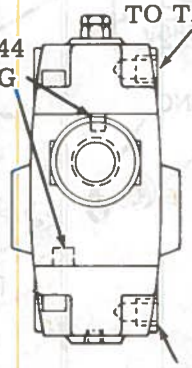
TYPICAL MODEL NUMBER
RCT-06-D4-30

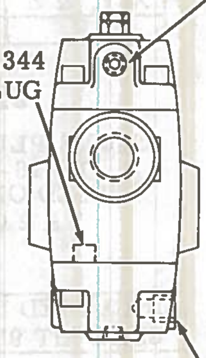
NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RT SERIES BACK PRESSURE VALVE RCT SERIES- COUNTERBALANCE VALVE	RT OR RCT SERIES- SEQUENCE VALVES	RT OR RCT SERIES- SEQUENCE VALVES	RT SERIES- UNLOADING VALVE RCT SERIES- COUNTERBALANCE VALVE
DIRECTLY CONTROLLED INTERNAL DRAIN	DIRECTLY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED INTERNAL DRAIN









For satisfactory service life of these components in industrial applications, use full flow filtration to ...ide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, ...RS series are recommended.

Service Parts Information

PRESSURE CONTROL VALVES

R(C)G-03-*P*-30

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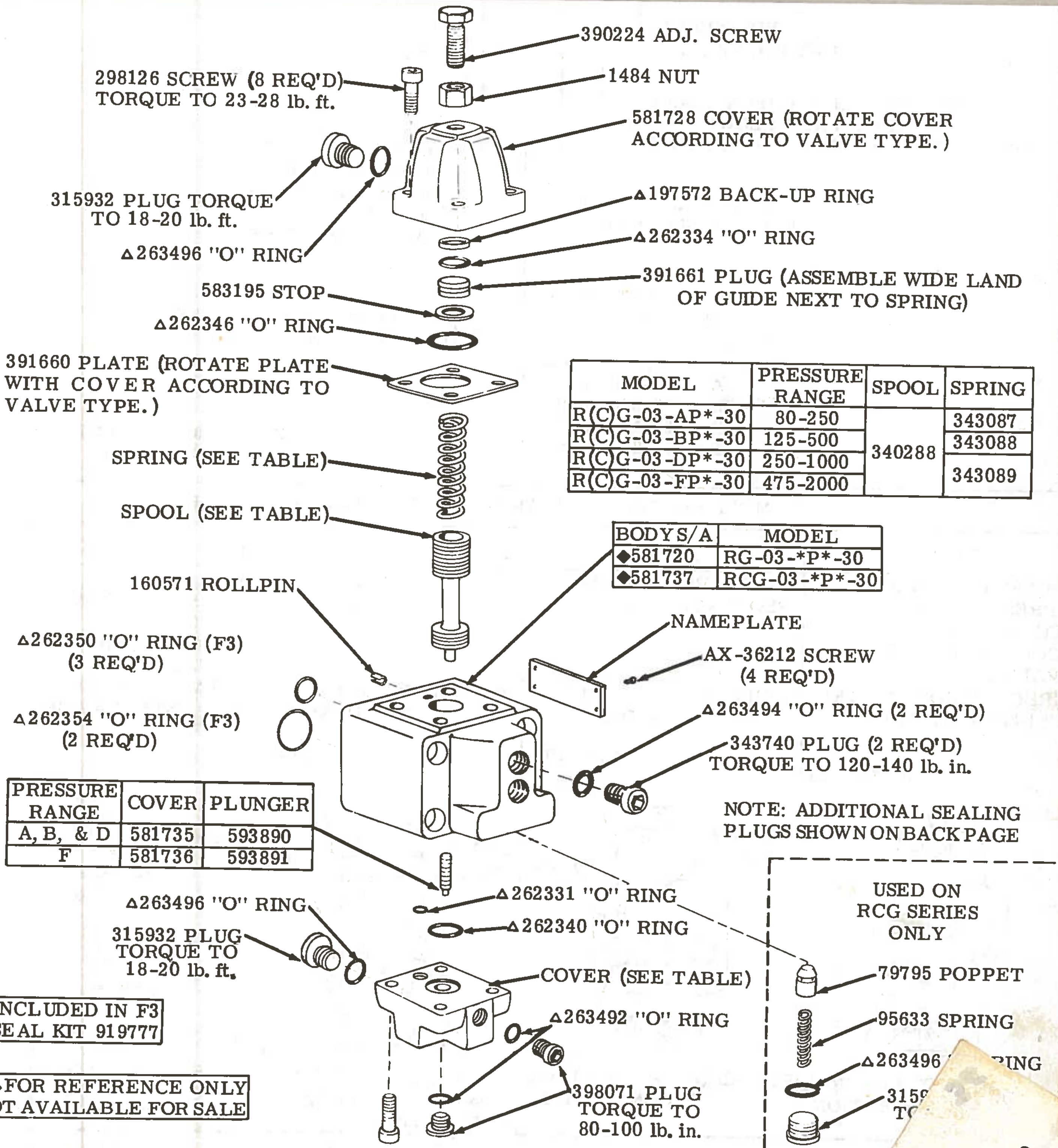

MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)G-03-AP*-30	80-250	340288	343087
R(C)G-03-BP*-30	125-500		343088
R(C)G-03-DP*-30	250-1000		343089
R(C)G-03-FP*-30	475-2000		

BODY S/A	MODEL
◆581720	RG-03-*P*-30
◆581737	RCG-03-*P*-30

PRESSURE RANGE	COVER	PLUNGER
A, B, & D	581735	593890
F	581736	593891

NOTE: ADDITIONAL SEALING PLUGS SHOWN ON BACK PAGE

△INCLUDED IN F3 SEAL KIT 919777

◆FOR REFERENCE ONLY NOT AVAILABLE FOR SALE

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P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

MODEL CODE BREAKDOWN

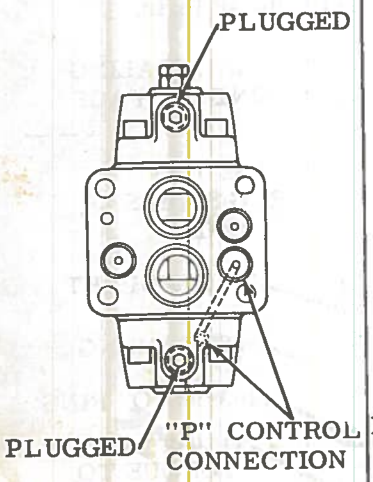
(F3)- R (C) G-03-*P*-30

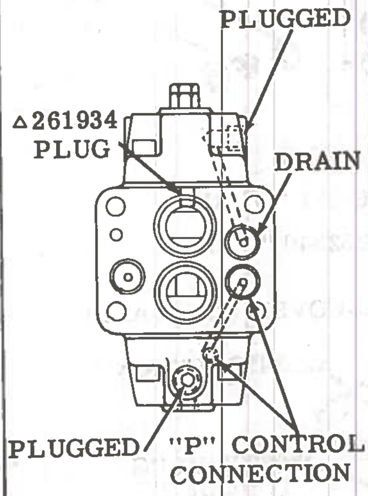
- **(F3)** — SPECIAL SEALS (OMIT FOR STD. MODELS)
- **R** — PRESSURE CONTROL VALVE
- **(C)** — "C" - WITH INTEGRAL CHECK VALVE (REVERSE FREE FLOW); OMITTED - WITHOUT CHECK VALVE
- **G** — MOUNTING MANIFOLD OR SUBPLATE
- **03** — NOMINAL VALVE SIZE 03 - 3/8"
- ***** — PRESSURE RANGE
  - A - 80-250 P. S. I.
  - B - 125-500 P. S. I.
  - D - 250-1000 P. S. I.
  - F - 475-2000 P. S. I.
- **P** — AUXILIARY REMOTE PRESSURE CONTROL CONNECTION
- ***** — VALVE TYPES (INSET VIEWS AT BOTTOM OF PAGE SHOW COVER POSITIONS FOR THE (4) VALVE TYPES)
- **30** — DESIGN

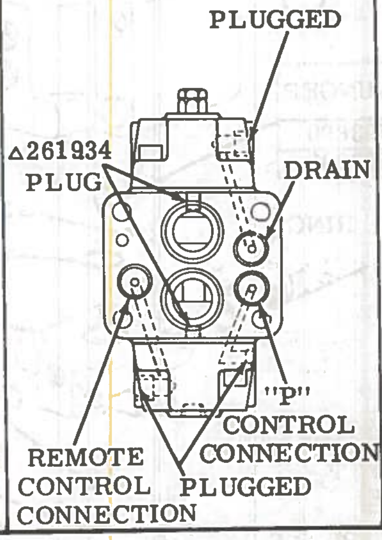
TYPICAL MODEL NUMBER
RCG-03-DP4-30

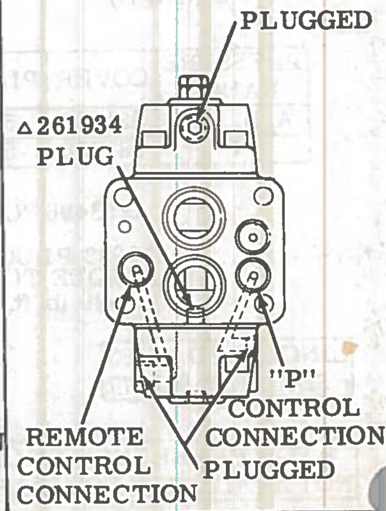
NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RG SERIES - BACK PRESSURE VALVE RCG SERIES - COUNTERBALANCE VALVE	RG OR RCG SERIES-SEQUENCE VALVES	RG OR RCG SERIES-SEQUENCE VALVES	RG SERIES-UNLOADING VALVE RCG SERIES-COUNTERBALANCE VALVE
DIRECTLY CONTROLLED INTERNAL DRAIN	DIRECTLY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED INTERNAL DRAIN









For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

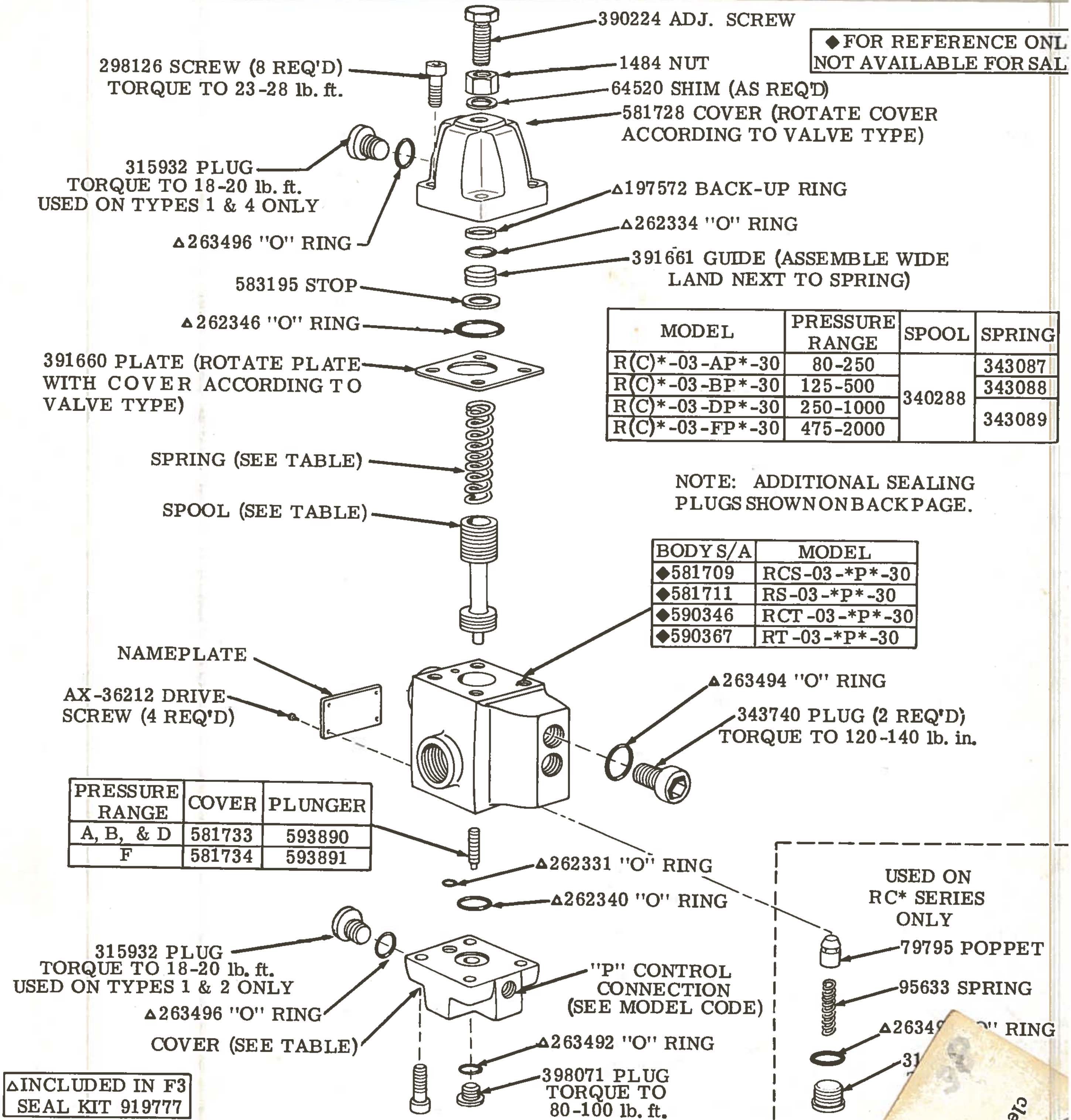
Service Parts Information

VICKERS®
A TRINOVA COMPANY

PRESSURE CONTROL VALVES

R(C)T-03-*P*-30

R(C)S-03-*P*-30



◆FOR REFERENCE ONL[Y]
NOT AVAILABLE FOR SAL[E]

MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)*-03-AP*-30	80-250	340288	343087
R(C)*-03-BP*-30	125-500		343088
R(C)*-03-DP*-30	250-1000		343089
R(C)*-03-FP*-30	475-2000		

NOTE: ADDITIONAL SEALING PLUGS SHOWN ON BACK PAGE.

BODY S/A	MODEL
◆581709	RCS-03-*P*-30
◆581711	RS-03-*P*-30
◆590346	RCT-03-*P*-30
◆590367	RT-03-*P*-30

PRESSURE RANGE	COVER	PLUNGER
A, B, & D	581733	593890
F	581734	593891

△INCLUDED IN F3 SEAL KIT 919777

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

MODEL CODE BREAKDOWN

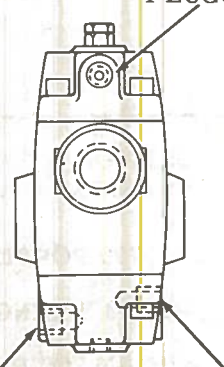
F3 - R (C) * -03-*P*-30

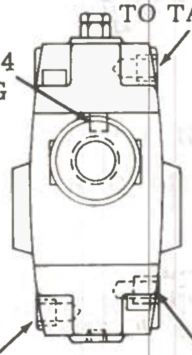
- **F3** — SPECIAL SEALS
- **R** — PRESSURE CONTROL VALVE
- **(C)** — "C" - WITH INTEGRAL CHECK VALVE (REVERSE FREE FLOW); OMITTED - WITHOUT CHECK VALVE
- ***** — MOUNTING: S - .750-16 UNF-2B THREAD; T - 3/8" NPTF THREAD
- **03** — CONNECTION SIZE: 03 - 3/8"
- ***** — PRESSURE RANGE:
  - A - 80-250 P. S. I.
  - B - 125-500 P. S. I.
  - D - 250-1000 P. S. I.
  - F - 475-2000 P. S. I.
- **P** — AUXILIARY REMOTE PRESSURE CONTROL CONNECTION
- ***** — VALVE TYPES (INSET VIEWS AT BOTTOM OF PAGE SHOW COVER POSITIONS FOR THE (4) VALVE TYPES)
- **30** — DESIGN

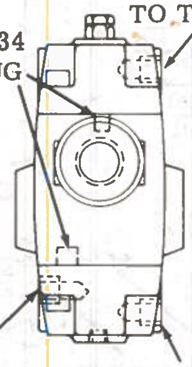
TYPICAL MODEL NUMBER
RCT-03-DP4-30

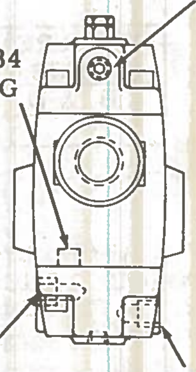
NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RT SERIES BACK PRESSURE VALVE; RCT SERIES- COUNTERBALANCE VALVE	RT OR RCT SERIES- SEQUENCE VALVES	RT OR RCT SERIES- SEQUENCE VALVES	RT SERIES- UNLOADING VALVE; RCT SERIES- COUNTERBALANCE VALVE
DIRECTLY CONTROLLED INTERNAL DRAIN	DIRECTLY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED INTERNAL DRAIN









For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO class code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

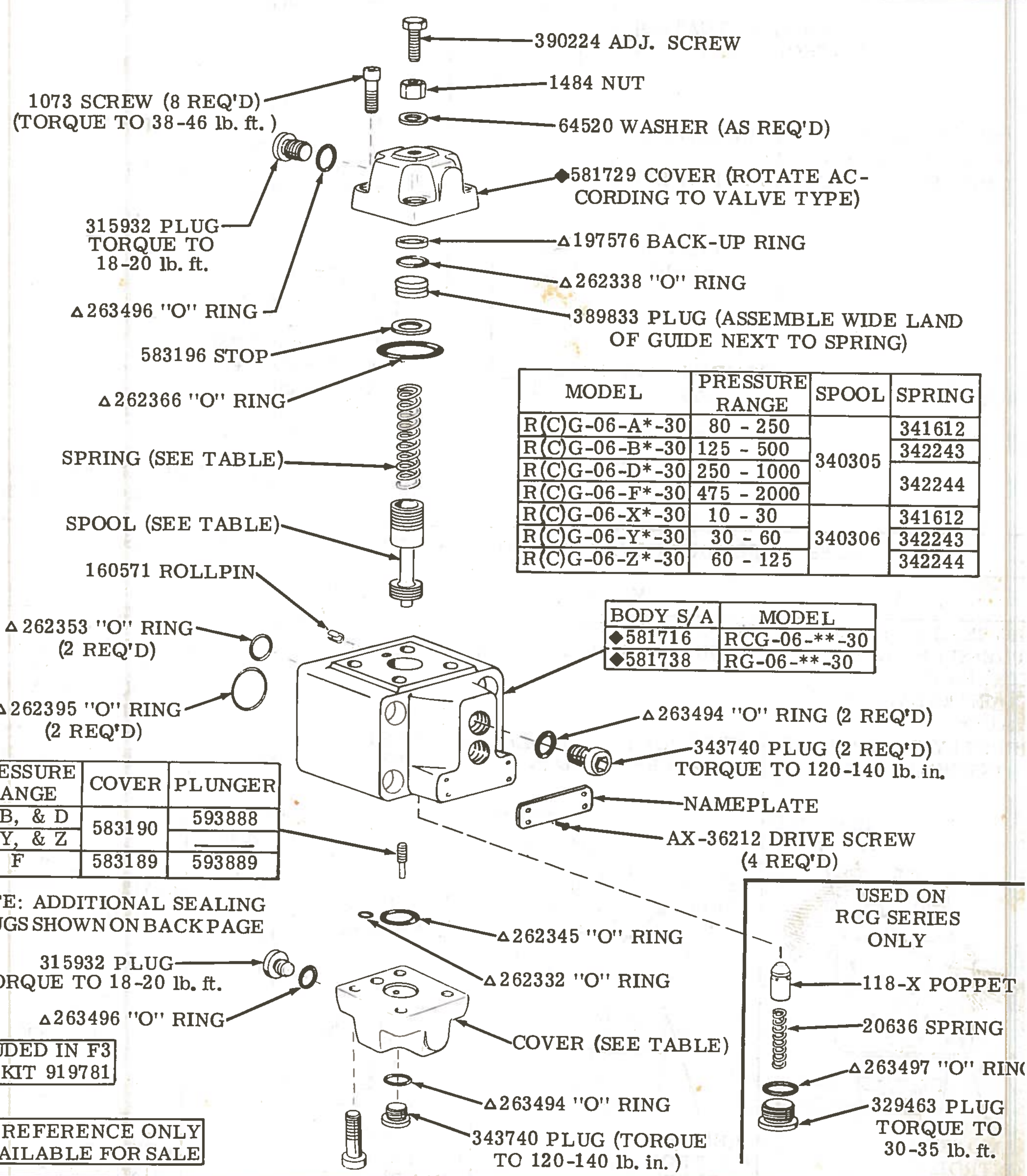
Litho in U. S. A.

Service Parts Information

VICKERS
A TRINOVA COMPANY

PRESSURE CONTROL VALVES

R(C)G-06-**-30



MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)G-06-A*-30	80 - 250	340305	341612
R(C)G-06-B*-30	125 - 500		342243
R(C)G-06-D*-30	250 - 1000		342244
R(C)G-06-F*-30	475 - 2000		
R(C)G-06-X*-30	10 - 30	340306	341612
R(C)G-06-Y*-30	30 - 60		342243
R(C)G-06-Z*-30	60 - 125		342244

BODY S/A	MODEL
◆581716	RCG-06-**-30
◆581738	RG-06-**-30

PRESSURE RANGE	COVER	PLUNGER
A, B, & D	583190	593888
X, Y, & Z		———
F	583189	593889

NOTE: ADDITIONAL SEALING PLUGS SHOWN ON BACK PAGE

△INCLUDED IN F3 SEAL KIT 919781

◆FOR REFERENCE ONLY NOT AVAILABLE FOR SALE

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

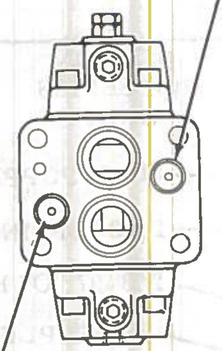
(F3)- R (C) G - 06 - * * - 30

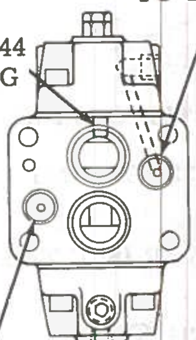
- (F3) — SPECIAL SEALS (OMIT FOR STD MODELS)
- R — PRESSURE ACTUATED CONTROL VALVE
- (C) — "C" - WITH INTEGRAL CHECK VALVE (REVERSE FREE FLOW)
  OMITTED - WITHOUT CHECK VALVE
- G — MOUNTING MANIFOLD OR SUBPLATE
- 06 — NOMINAL VALVE SIZE
  06 - 3/4"
- * — PRESSURE RANGE
  - A - 80-250 PSI
  - B - 125-500 PSI
  - D - 250-1000 PSI
  - F - 475-2000 PSI
  - X - 10-30 PSI
  - Y - 30-60 PSI
  - Z - 60-125 PSI
- * — VALVE TYPES (INSET VIEWS AT BOTTOM OF PAGE SHOW COVER POSITIONS FOR THE (4) VALVE TYPES)
- 30 — DESIGN

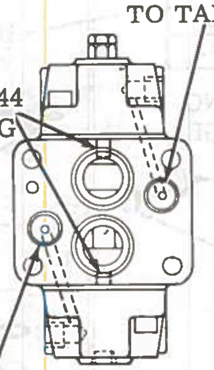
TYPICAL MODEL NUMBER
RCG-06-D4-30

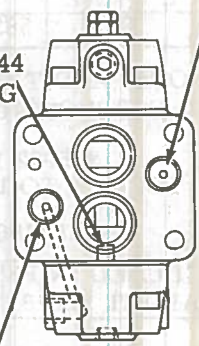
NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RG SERIES - BACK PRESSURE VALVE CG SERIES - COUNTERBALANCE VALVE	RG OR RCG SERIES- SEQUENCE VALVES	RG OR RCG SERIES- SEQUENCE VALVES	RG SERIES- UNLOADING VALVE RCG SERIES- COUNTERBALANCE VALVE
DIRECTLY CONTROLLED INTERNAL DRAIN	DIRECTLY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED INTERNAL DRAIN









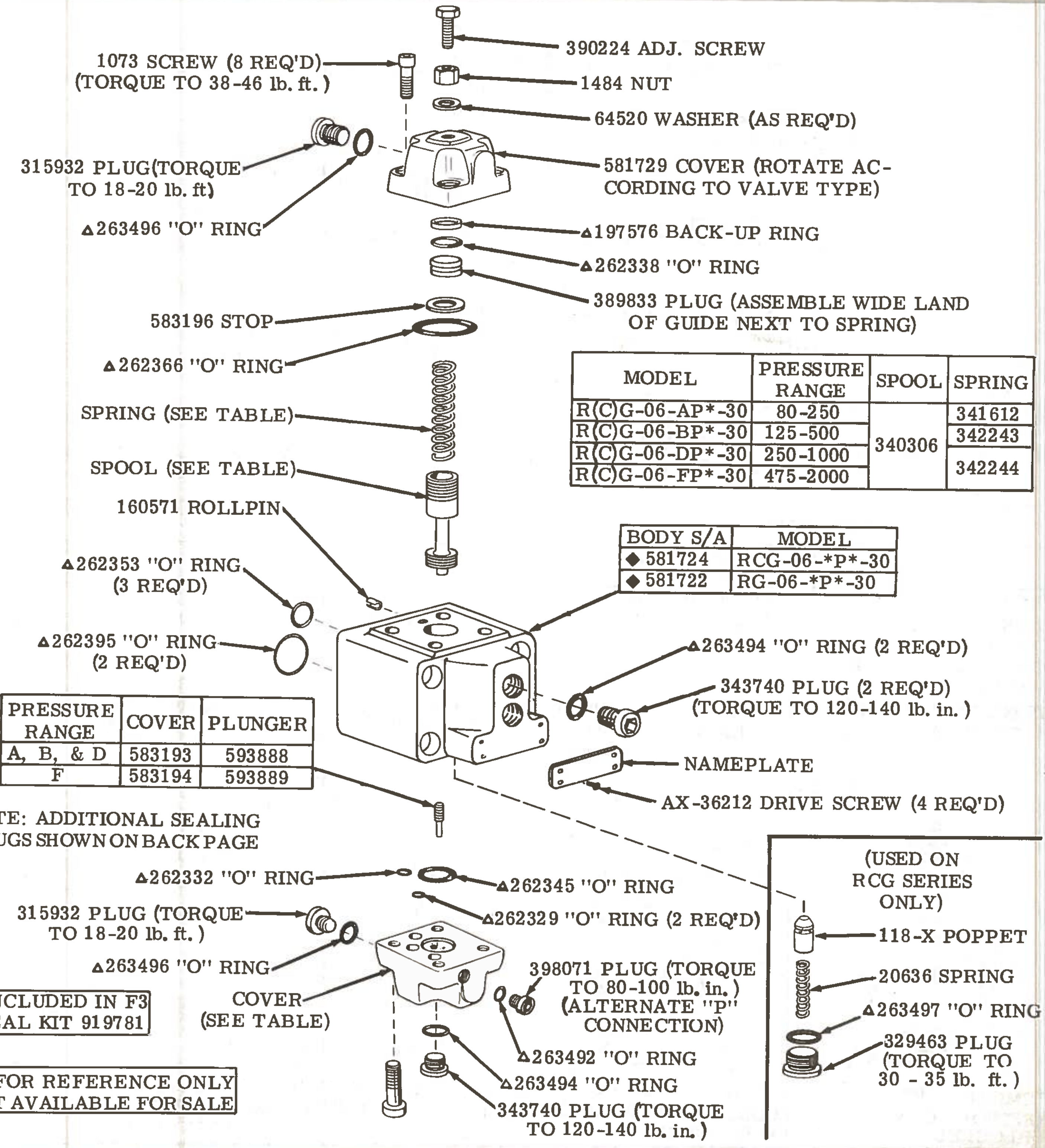
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

VICKERS®
A TRINOVA COMPANY

PRESSURE CONTROL VALVES

R(C)G-06-*P*-30



MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)G-06-AP*-30	80-250	340306	341612
R(C)G-06-BP*-30	125-500		342243
R(C)G-06-DP*-30	250-1000		342244
R(C)G-06-FP*-30	475-2000		

BODY S/A	MODEL
◆ 581724	RCG-06-*P*-30
◆ 581722	RG-06-*P*-30

PRESSURE RANGE	COVER	PLUNGER
A, B, & D	583193	593888
F	583194	593889

NOTE: ADDITIONAL SEALING PLUGS SHOWN ON BACK PAGE

▵INCLUDED IN F3 SEAL KIT 919781

◆FOR REFERENCE ONLY NOT AVAILABLE FOR SALE

MODEL CODE BREAKDOWN

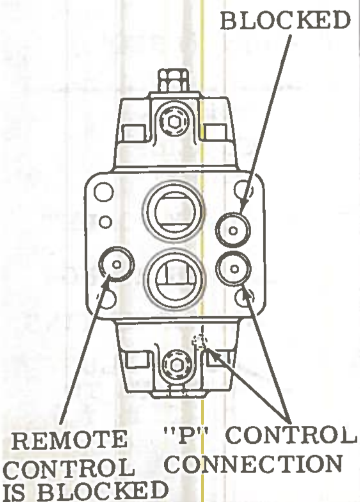
(F3)-R (C) G-06-*P*-30

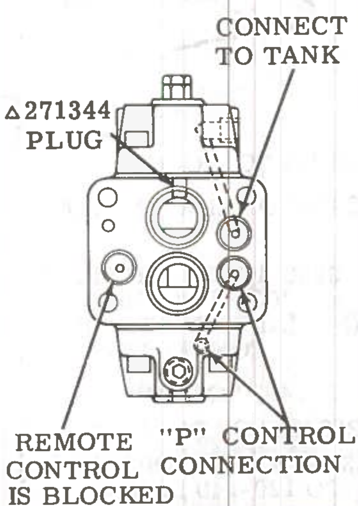
- **(F3)** — SPECIAL SEALS (OMIT FOR STD MODELS)
- **R** — PRESSURE CONTROL VALVE
- **(C)** — "C" - WITH INTEGRAL CHECK VALVE (REVERSE FREE FLOW); OMITTED - WITHOUT CHECK VALVE
- **G** — MOUNTING MANIFOLD OR SUBPLATE
- **06** — NOMINAL VALVE SIZE 06 - 3/4"
- ***** — PRESSURE RANGE
  - A - 80-250 P. S. I.
  - B - 125-500 P. S. I.
  - D - 250-1000 P. S. I.
  - F - 475-2000 P. S. I.
- **P** — AUXILIARY REMOTE PRESSURE CONTROL CONNECTION
- ***** — VALVE TYPES (INSET VIEWS AT BOTTOM OF PAGE SHOW COVER POSITIONS FOR THE (4) VALVE TYPES)
- **30** — DESIGN

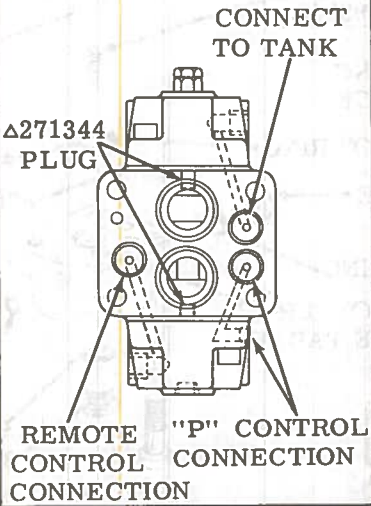
TYPICAL MODEL NUMBER
RCG-06-DP4-30

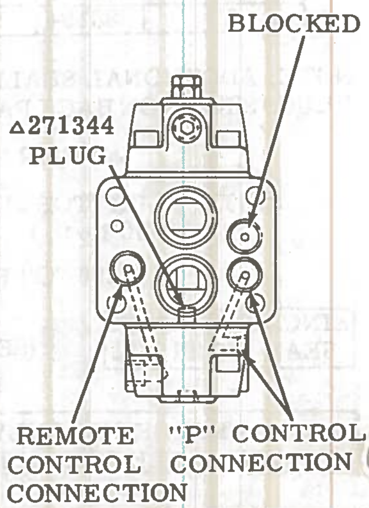
NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RG SERIES - BACK PRESSURE VALVE RCG SERIES - COUNTERBALANCE VALVE	RG OR RCG SERIES- SEQUENCE VALVES	RG OR RCG SERIES- SEQUENCE VALVES	RG SERIES- UNLOADING VALVE RCG SERIES- COUNTERBALANCE VALVE
DIRECTLY CONTROLLED INTERNAL DRAIN	DIRECTLY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED INTERNAL DRAIN









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Litho in U. S. A.

Service Parts Information

PRESSURE CONTROL VALVES

VICKERS®
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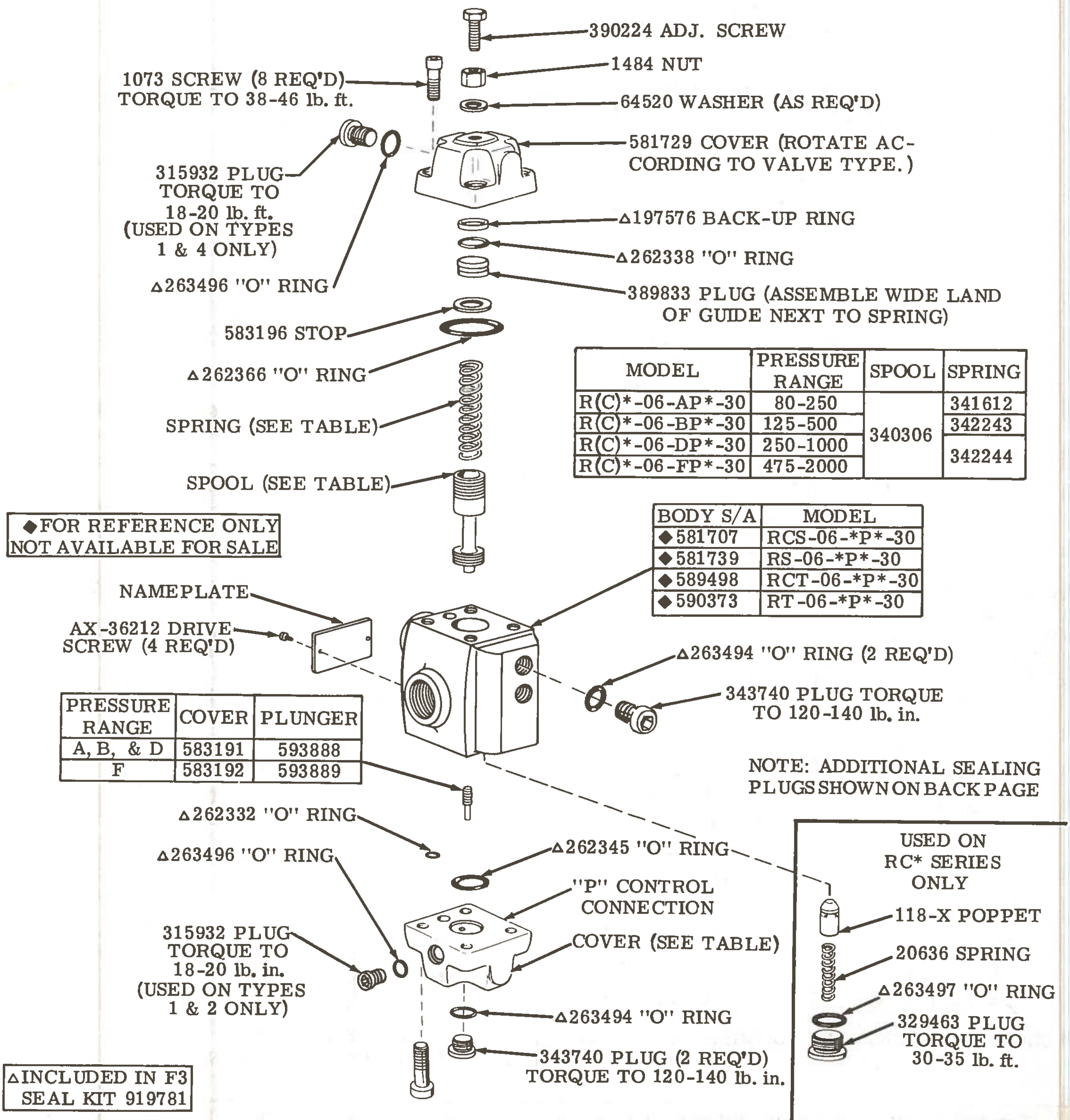
R(C)S-06-*P*-30 R(C)T-06-*P*-30



MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)*-06-AP*-30	80-250	340306	341612
R(C)*-06-BP*-30	125-500		342243
R(C)*-06-DP*-30	250-1000		342244
R(C)*-06-FP*-30	475-2000		

BODY S/A	MODEL
◆581707	RCS-06-*P*-30
◆581739	RS-06-*P*-30
◆589498	RCT-06-*P*-30
◆590373	RT-06-*P*-30

PRESSURE RANGE	COVER	PLUNGER
A, B, & D	583191	593888
F	583192	593889

MODEL CODE BREAKDOWN

F3 - R (C) * -06-*P*-30

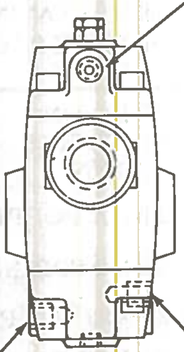
- F3 — SPECIAL SEALS
- R — PRESSURE CONTROL VALVE
- (C) — "C" - WITH INTEGRAL CHECK VALVE (REVERSE FREE FLOW); OMITTED - WITHOUT CHECK VALVE
- * — MOUNTING: S - 1.0625-12 UN-2B THREAD; T - 3/4" NPTF THREAD
- 06 — CONNECTION SIZE: 06 - 3/4" PIPE THD.
- * — PRESSURE RANGE: A - 80-250 P.S.I.; B - 125-500 P.S.I.; D - 250-1000 P.S.I.; F - 475-2000 P.S.I.
- P — AUXILIARY REMOTE PRESSURE CONTROL CONNECTION
- * — VALVE TYPES (INSET VIEWS AT BOTTOM OF PAGE SHOW COVER POSITIONS FOR THE (4) VALVE TYPES)
- 30 — DESIGN

TYPICAL MODEL NUMBER
RCT-06-DP4-30

NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RT SERIES BACK PRESSURE VALVE RCT SERIES- COUNTERBALANCE VALVE	RT OR RCT SERIES- SEQUENCE VALVES	RT OR RCT SERIES- SEQUENCE VALVES	RT SERIES- UNLOADING VALVE RCT SERIES- COUNTERBALANCE VALVE
DIRECTLY CONTROLLED INTERNAL DRAIN	DIRECTLY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED INTERNAL DRAIN

TYPE 1



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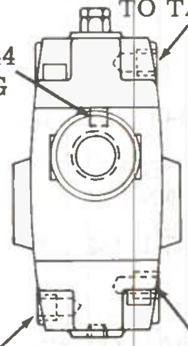

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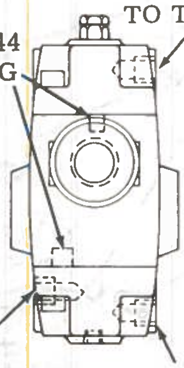

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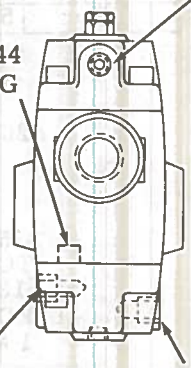

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

Service Parts Information

PRESSURE CONTROL VALVES

(F3)R(C)G-10-* *-30

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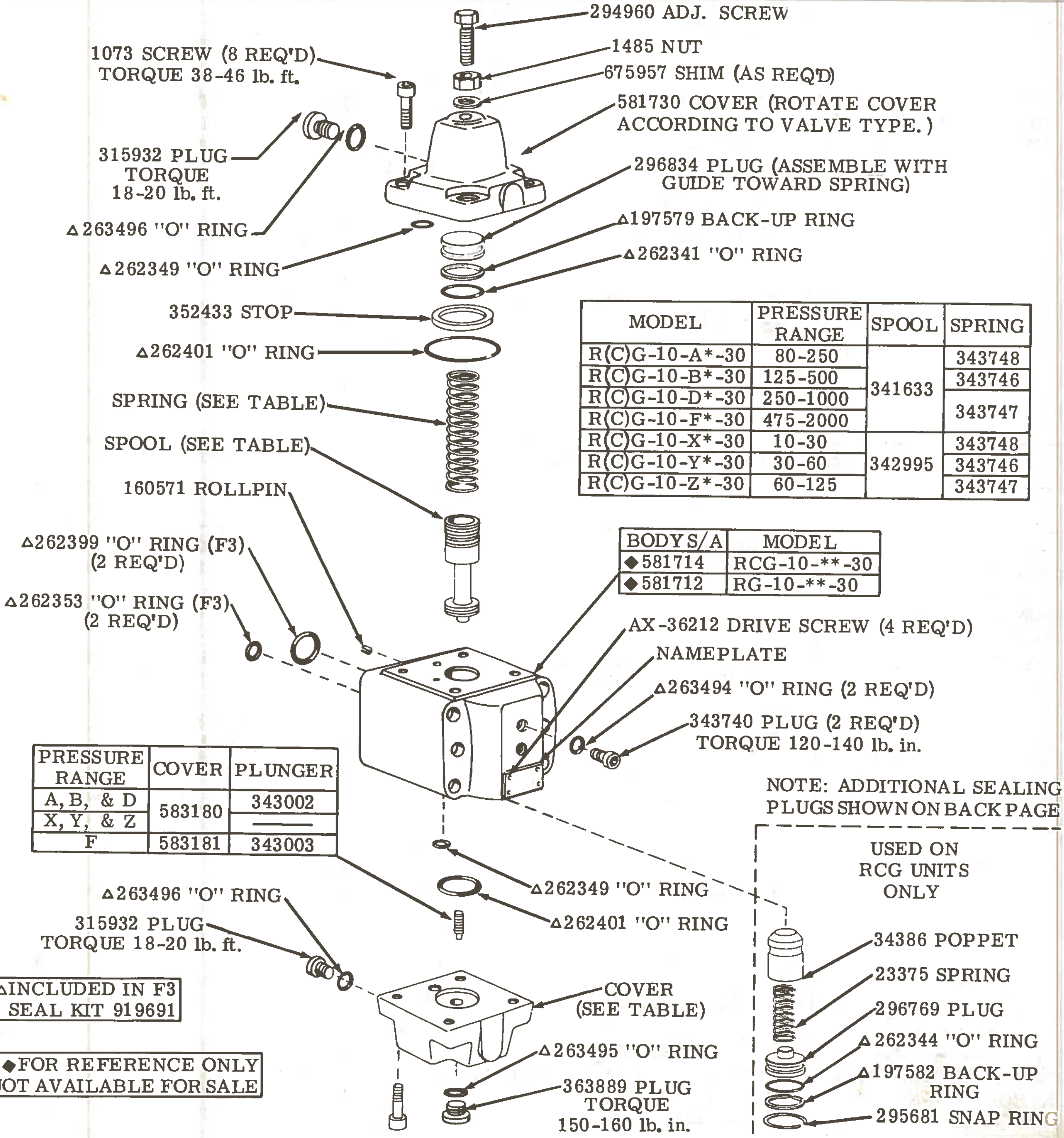
A TRINOVA COMPANY



MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)G-10-A*-30	80-250	341633	343748
R(C)G-10-B*-30	125-500		343746
R(C)G-10-D*-30	250-1000		343747
R(C)G-10-F*-30	475-2000		
R(C)G-10-X*-30	10-30	342995	343748
R(C)G-10-Y*-30	30-60		343746
R(C)G-10-Z*-30	60-125		343747

BODY S/A	MODEL
◆581714	RCG-10-**-30
◆581712	RG-10-**-30

PRESSURE RANGE	COVER	PLUNGER
A, B, & D	583180	343002
X, Y, & Z		———
F	583181	343003

△INCLUDED IN F3 SEAL KIT 919691

◆FOR REFERENCE ONLY NOT AVAILABLE FOR SALE

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

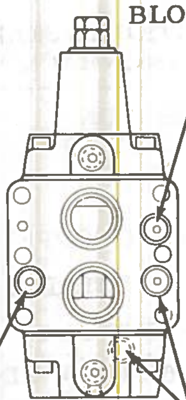
(F3)- R (C) G-10--3***

- **(F3)** – SPECIAL SEALS (OMIT FOR STD MODELS)
- **R** – PRESSURE CONTROL VALVE
- **(C)** – "C" - WITH INTEGRAL CHECK VALVE (REVERSE FREE FLOW); OMITTED - WITHOUT CHECK VALVE
- **G** – MOUNTING MANIFOLD OR SUBPLATE
- **10** – NOMINAL VALVE SIZE: 10 - $1\frac{1}{4}$ INCH
- ***** – PRESSURE RANGE
  - A - 80-250 PSI
  - B - 125-500 PSI
  - D - 250-1000 PSI
  - F - 475-2000 PSI
  - X - 10-30 PSI
  - Y - 30-60 PSI
  - Z - 60-125 PSI
- ***** – VALVE TYPES (INSET VIEWS AT BOTTOM OF PAGE SHOW COVER POSITIONS FOR THE (4) VALVE TYPES)
- **3*** – DESIGN

NOTE: ASSEMBLE COVER AND PLUGS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
:G SERIES - ;ACK PRESSURE VALVE :CG SERIES - COUNTERBALANCE VALVE	RG OR RCG SERIES - SEQUENCE VALVES	RG OR RCG SERIES - SEQUENCE VALVES	RG SERIES - UNLOADING VALVE RCG SERIES - COUNTERBALANCE VALVE
DIRECTLY CONTROLLED INTERNAL DRAIN	DIRECTLY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED INTERNAL DRAIN

TYPE 1



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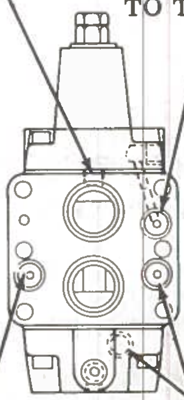

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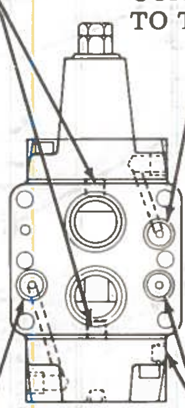
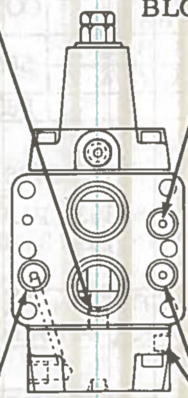


TYPE 4



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Litho in U. S. A.

Service Parts Information

PRESSURE CONTROL VALVES

R(C)G-10-*P*-30

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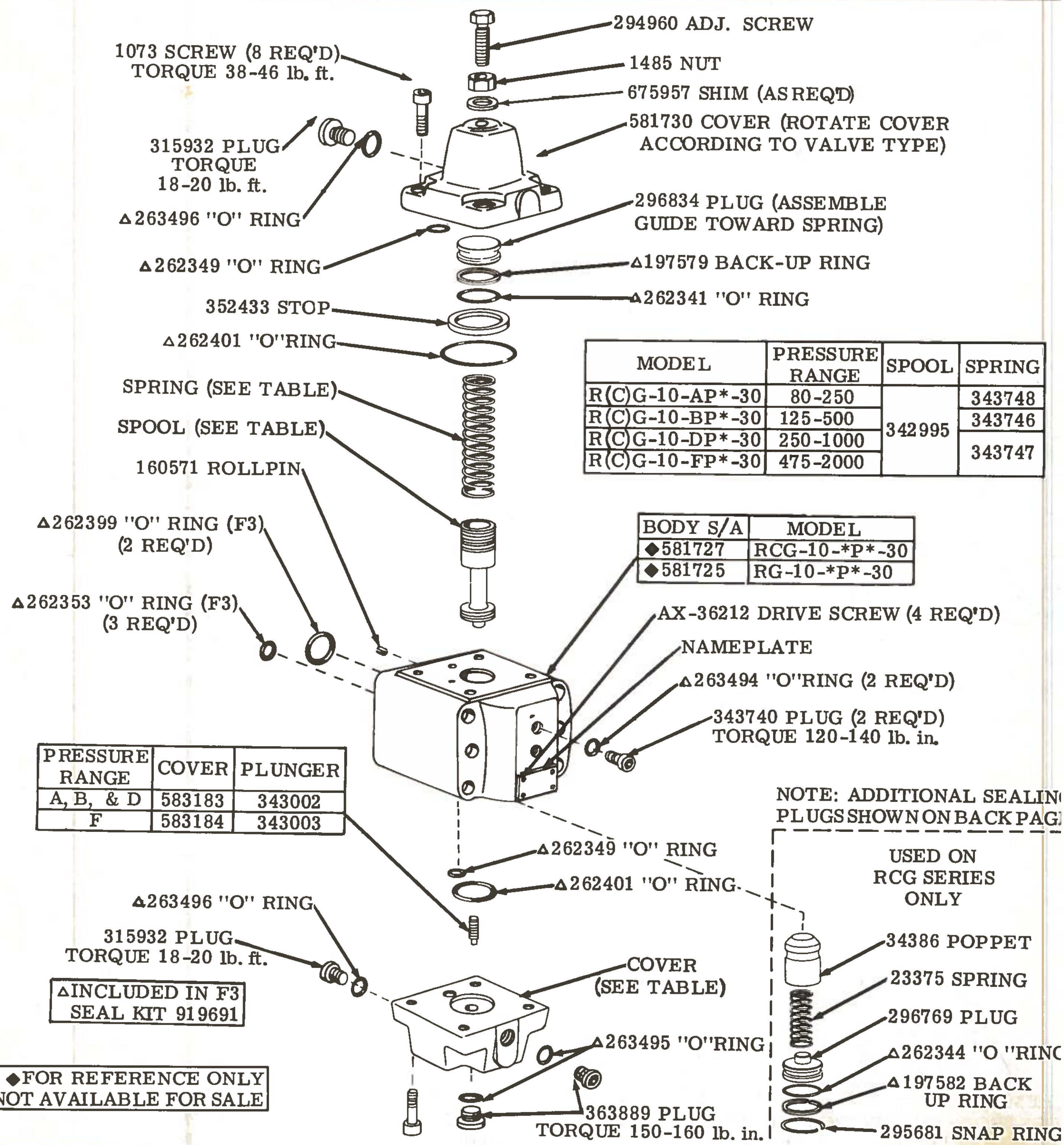


MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)G-10-AP*-30	80-250	342995	343748
R(C)G-10-BP*-30	125-500		343746
R(C)G-10-DP*-30	250-1000		343747
R(C)G-10-FP*-30	475-2000		

BODY S/A	MODEL
◆581727	RCG-10-*P*-30
◆581725	RG-10-*P*-30

PRESSURE RANGE	COVER	PLUNGER
A, B, & D	583183	343002
F	583184	343003

ΔINCLUDED IN F3 SEAL KIT 919691

◆FOR REFERENCE ONLY NOT AVAILABLE FOR SALE

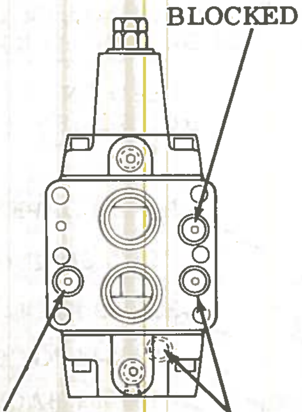
MODEL CODE BREAKDOWN

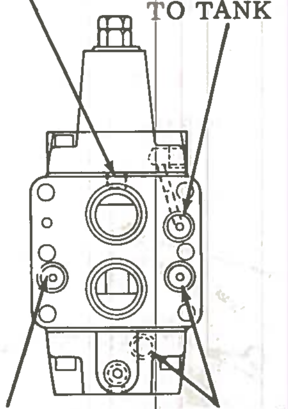
(F3)- R (C) G-10-*P*-2*

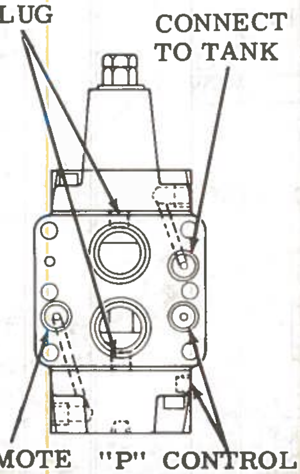
- **(F3)** – SPECIAL SEALS (OMIT FOR STD. MODELS)
- **R** – PRESSURE CONTROL VALVE
- **(C)** – "C" - WITH INTEGRAL CHECK VALVE (REVERSE FREE FLOW) OMITTED - WITHOUT CHECK VALVE
- **G** – MOUNTING MANIFOLD OR SUBPLATE
- **10** – NOMINAL VALVE 10 - 1¼"
- ***** – PRESSURE RANGE
  - A - 80-250 PSI
  - B - 125-500 PSI
  - D - 250-1000 PSI
  - F - 475-2000 PSI
- **P** – AUXILIARY REMOTE PRESSURE CONTROL CONNECTION
- ***** – VALVE TYPES (INSET VIEWS AT BOTTOM OF PAGE SHOW COVER POSITIONS FOR THE (4) VALVE TYPES)
- **2*** – DESIGN

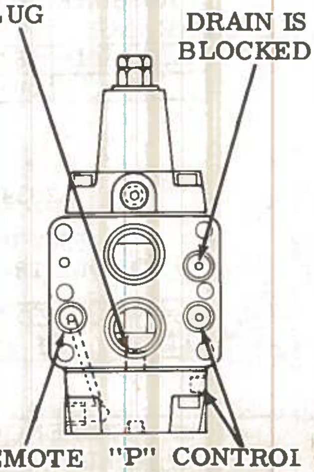
NOTE: ASSEMBLE COVER AND PLUGS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RG SERIES - BACK PRESSURE VALVE RCG SERIES - COUNTERBALANCE VALVE	RG OR RCG SERIES - SEQUENCE VALVES	RG OR RCG SERIES - SEQUENCE VALVES	RG SERIES - UNLOADING VALVE RCG SERIES - COUNTERBALANCE VALVE
DIRECTLY CONTROLLED INTERNAL DRAIN	DIRECTLY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED EXTERNAL DRAIN	REMOTELY CONTROLLED INTERNAL DRAIN









For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

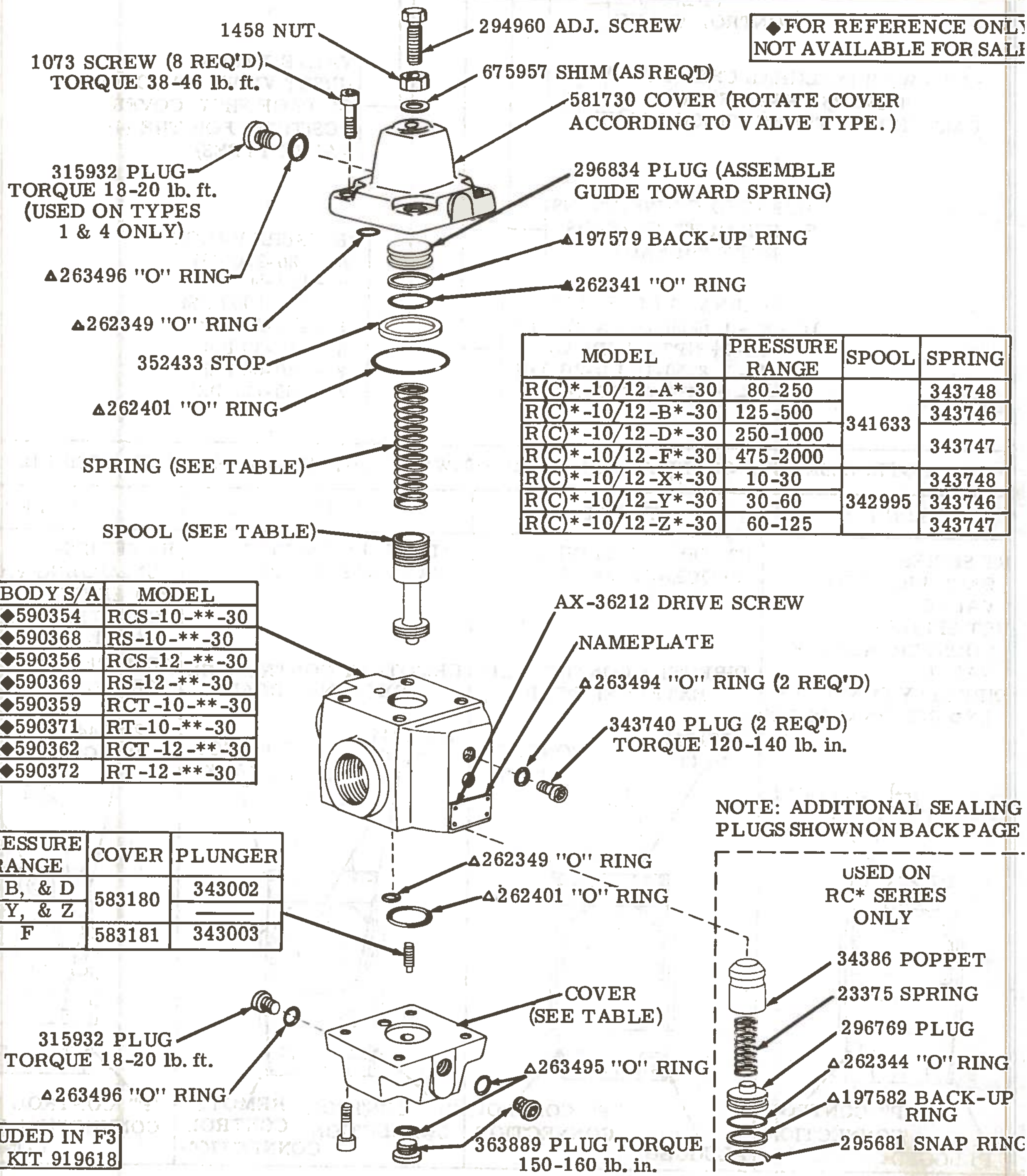
Service Parts Information

PRESSURE CONTROL VALVES

R(C)T-10/12-**-30

R(C)S-10/12-**-30

VICKERS®
A TRINOVA COMPANY



◆FOR REFERENCE ONLY NOT AVAILABLE FOR SALE

MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)*-10/12-A*-30	80-250	341633	343748
R(C)*-10/12-B*-30	125-500		343746
R(C)*-10/12-D*-30	250-1000		343747
R(C)*-10/12-F*-30	475-2000		
R(C)*-10/12-X*-30	10-30	342995	343748
R(C)*-10/12-Y*-30	30-60		343746
R(C)*-10/12-Z*-30	60-125		343747

BODY S/A	MODEL
◆590354	RCS-10-**-30
◆590368	RS-10-**-30
◆590356	RCS-12-**-30
◆590369	RS-12-**-30
◆590359	RCT-10-**-30
◆590371	RT-10-**-30
◆590362	RCT-12-**-30
◆590372	RT-12-**-30

PRESSURE RANGE	COVER	PLUNGER
A, B, & D	583180	343002
X, Y, & Z		———
F	583181	343003

NOTE: ADDITIONAL SEALING PLUGS SHOWN ON BACK PAGE

△INCLUDED IN F3 SEAL KIT 919618

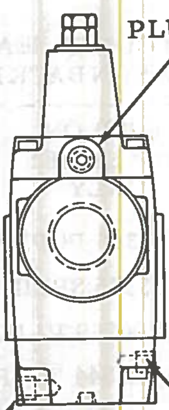
MODEL CODE BREAKDOWN

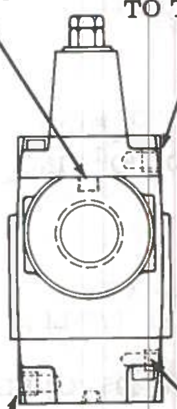
F3 - R (C) T- ** - ** -3*

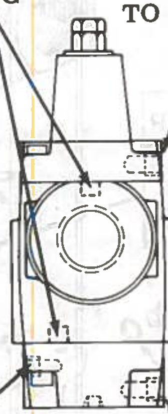
- SPECIAL SEALS
- PRESSURE CONTROL VALVE
- "C" - WITH INTEGRAL CHECK VALVE (REVERSE FREE FLOW)
  OMITTED - WITHOUT CHECK VALVE
- THREADED CONNECTIONS
  S - STRAIGHT THREADS
  T - NPTF THREADS
- NOMINAL VALVE SIZE
  10 - S - 1.6250-12 UN-2B THD
  T - $1\frac{1}{4}$ NPTF THREAD
  12 - S - 1.8750-12 UN-2B THD
  T - $1\frac{1}{2}$ NPTF THREAD
- VALVE TYPES (INSET VIEWS AT BOTTOM OF PAGE SHOW COVER POSITIONS FOR THE (4) VALVE TYPES)
- PRESSURE RANGE
  A - 80-250 PSI
  B - 125-500 PSI
  D - 250-1000 PSI
  F - 475-2000 PSI
  X - 10-30 PSI
  Y - 30-60 PSI
  Z - 60-125 PSI
- DESIGN

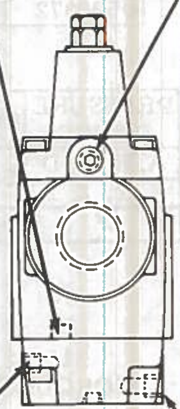
NOTE: ASSEMBLE COVER AND PLUGS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RT SERIES- BACK PRESSURE VALVE RCT SERIES- COUNTERBALANCE VALVE DIRECTLY CONTROL-LED INTERNAL DRAIN	RT OR RCT SERIES- SEQUENCE VALVES DIRECTLY CONTROLLED EXTERNAL DRAIN	RT OR RCT SERIES- SEQUENCE VALVES REMOTELY CONTROLLED EXTERNAL DRAIN	RT SERIES- UNLOADING VALVE RCT SERIES- COUNTERBALANCE VALVE REMOTELY CONTROL-LED INTERNAL DRAIN









For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

Service Parts Information

PRESSURE CONTROL VALVES

R(C)T-10/12-*P*-30

R(C)S-10/12-*P*-30

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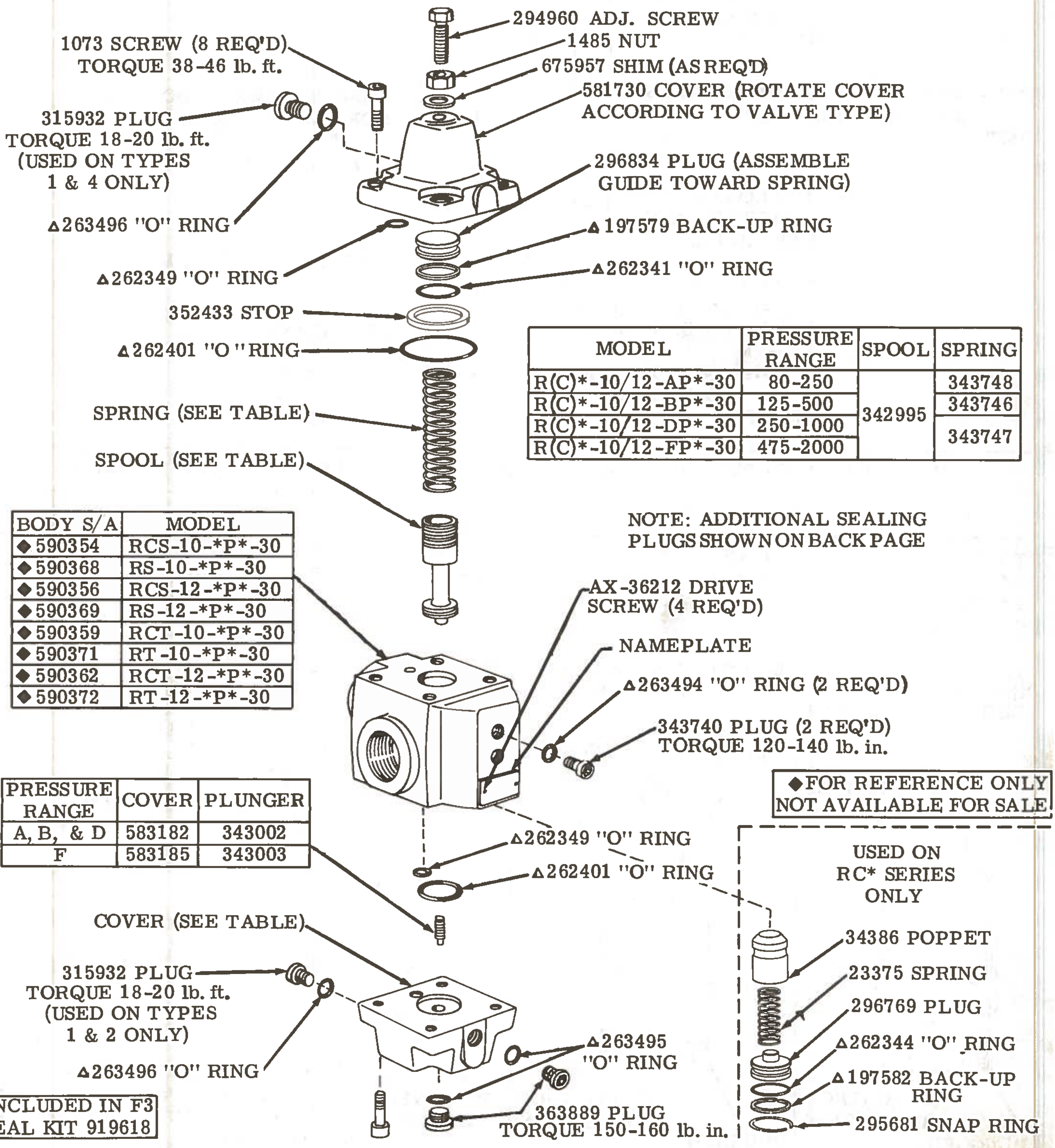


MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)*-10/12-AP*-30	80-250	342995	343748
R(C)*-10/12-BP*-30	125-500		343746
R(C)*-10/12-DP*-30	250-1000		343747
R(C)*-10/12-FP*-30	475-2000		

BODY S/A	MODEL
◆ 590354	RCS-10-*P*-30
◆ 590368	RS-10-*P*-30
◆ 590356	RCS-12-*P*-30
◆ 590369	RS-12-*P*-30
◆ 590359	RCT-10-*P*-30
◆ 590371	RT-10-*P*-30
◆ 590362	RCT-12-*P*-30
◆ 590372	RT-12-*P*-30

◆FOR REFERENCE ONLY NOT AVAILABLE FOR SALE

PRESSURE RANGE	COVER	PLUNGER
A, B, & D	583182	343002
F	583185	343003

▵INCLUDED IN F3 SEAL KIT 919618

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

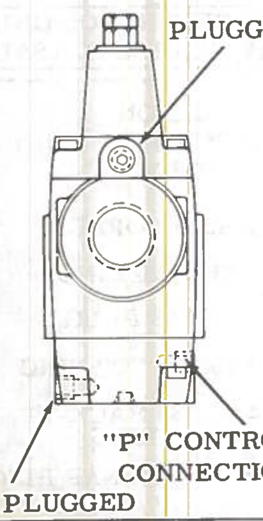
MODEL CODE BREAKDOWN

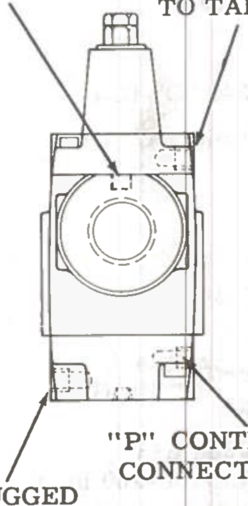
F3 -R (C) T- ** - * P * -3*

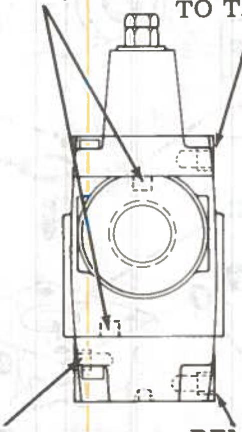
- SPECIAL SEALS — F3
- PRESSURE CONTROL VALVE — R
- "C" - WITH INTEGRAL CHECK VALVE (REVERSE FREE FLOW); OMITTED - WITHOUT CHECK VALVE — (C)
- THREADED CONNECTIONS — T
  - S - STRAIGHT THREAD
  - T - NPTF THREAD
- NOMINAL VALVE SIZE — **
  - 10 - S - 1.625-12 UN-2B THREAD FOR 1.25 O.D. TUBING
  - T - $1\frac{1}{4}$ NPTF
  - 12 - S - 1.875-12 UN-2B THREAD FOR 1.50 O.D. TUBING
  - T - $1\frac{1}{2}$ NPTF
- PRESSURE RANGE — *
  - A - 80 - 250
  - B - 125 - 500
  - D - 250 - 1000
  - F - 475 - 2000
- AUXILIARY REMOTE CONTROL CONNECTION. — P
- VALVE TYPES (INSET VIEWS AT BOTTOM OF PAGE SHOW COVER POSITIONS FOR THE (4) VALVE TYPES) — *
- DESIGN — -3*

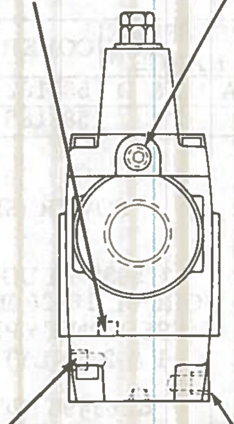
NOTE: ASSEMBLE COVER AND PLUGS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RT SERIES- BACK PRESSURE VALVE RCT SERIES- COUNTERBALANCE VALVE DIRECTLY CONTROL- LED INTERNAL DRAIN	RT OR RCT SERIES- SEQUENCE VALVES DIRECTLY CONTROLLED EXTERNAL DRAIN	RT OR RCT SERIES- SEQUENCE VALVES REMOTELY CONTROLLED EXTERNAL DRAIN	RT SERIES- UNLOADING VALVE RCT SERIES- COUNTERBALANCE VALVE REMOTELY CONTROL- LED INTERNAL DRAIN









For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

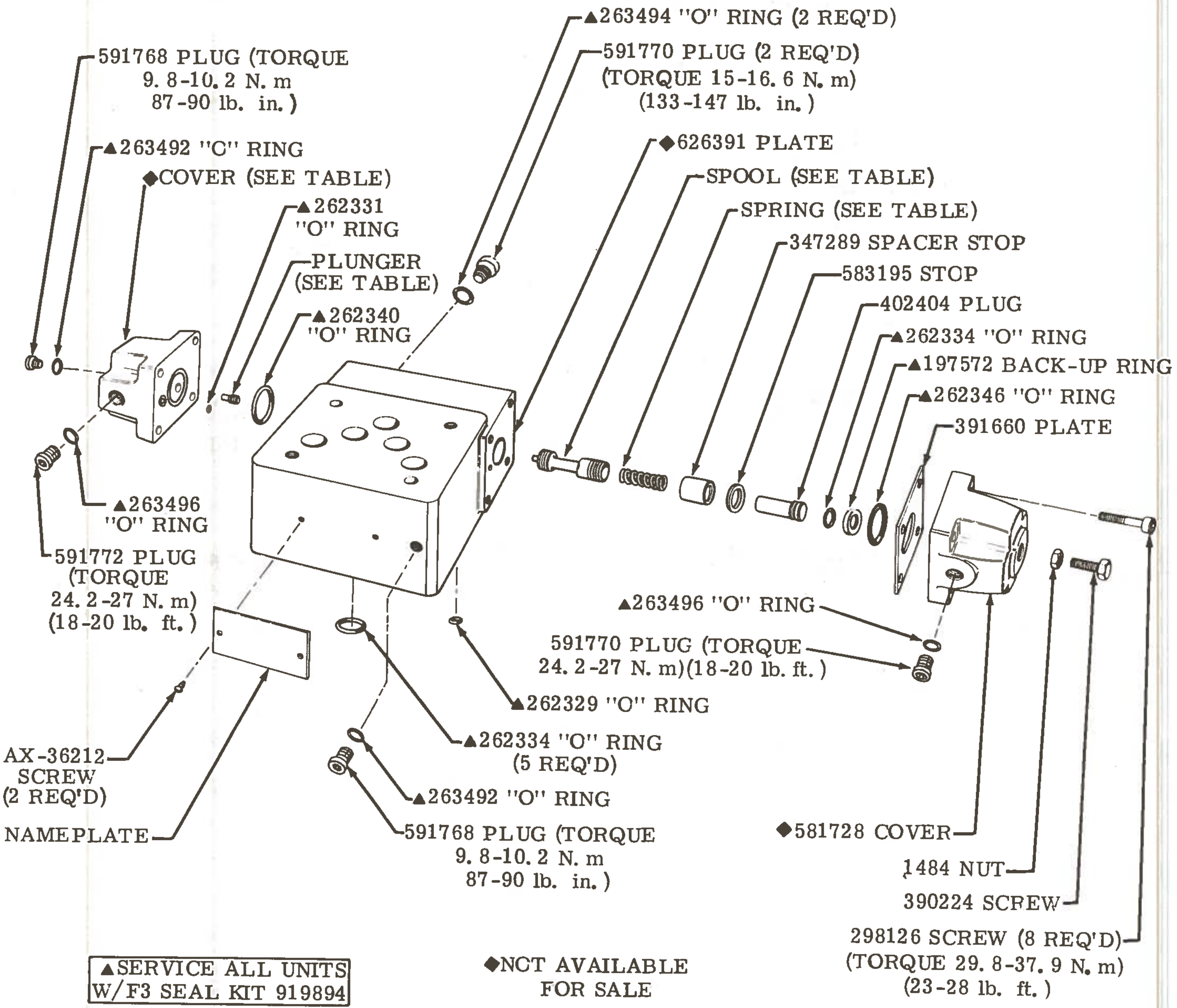
Litho in U.S.A.

Service Parts Information

VICKERS®
A TRINOVA COMPANY

MODULAR SEQUENCE VALVES

(F3)DGR-01-*2-52



▲SERVICE ALL UNITS W/F3 SEAL KIT 919894

◆NOT AVAILABLE FOR SALE

NOTE
WHEN TWO OR MORE MODULES ARE ASSEMBLED TOGETHER, THIS MODULE MUST BE MOUNTED NEXT TO THE SUBPLATE OR MOUNTING SURFACE TO ACCOMMODATE THE EXTERNAL DRAIN ("Y" PORT).

MODEL	COVER	PLUNGER	SPOOL	SPRING
DGR-01-A2-52	581732	593890	340287	343087
DGR-01-B2-52				343088
DGR-01-D2-52				343089
DGR-01-F2-52	581731	593891		
DGR-01-X2-52	581732	——	340288	343087
DGR-01-Y2-52				343088
DGR-01-Z2-52				343089

MODEL CODE BREAKDOWN

(F3) - DGR - 01 - *2 - 52

- **(F3)** — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- **D** — DIRECTIONAL CONTROL
- **G** — MANIFOLD OR SUBPLATE MOUNTED
- **R** — SEQUENCE MODULE
- **01** — 1/8 INCH SIZE
- ***** — PRESSURE RANGE

A - 80 - 250 PSI	X - 10 - 30 PSI
B - 125 - 500 PSI	Y - 30 - 60 PSI
D - 250 - 1000 PSI	Z - 60 - 125 PSI
F - 475 - 2000 PSI	

- **2** — MODULE ACTION (DIRECTLY OPERATED-EXTERNALLY DRAINED)
- **52** — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

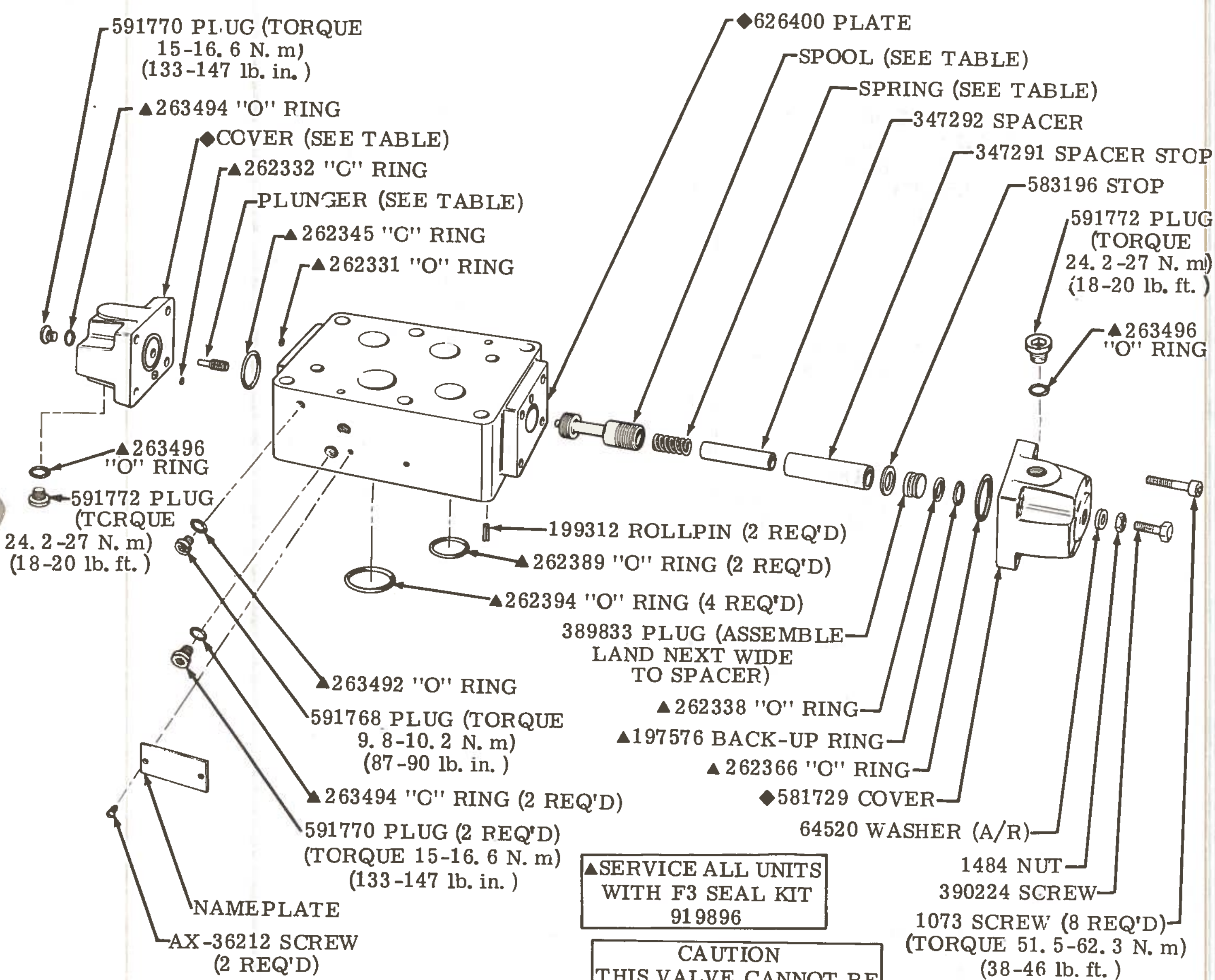
Litho in U. S. A.

Service Parts Information

VICKERS®
A TRINOVA COMPANY

MODULAR SEQUENCE VALVES

DGR-06-*2-52



▲SERVICE ALL UNITS WITH F3 SEAL KIT 919896

CAUTION
THIS VALVE CANNOT BE USED WITH PRESSURE CENTERED VALVES

MODEL	COVER	PLUNGER	SPOOL	SPRING
DGR-06-A2-52	583190	593888	340305	341612
DGR-06-B2-52				342243
DGR-06-D2-52				342244
DGR-06-F2-52	583189	593889		
DGR-06-X2-52	-583190	———	340306	341612
DGR-06-Y2-52				342243
DGR-06-Z2-52				342244

NOTE
WHEN TWO OR MORE MODULES ARE ASSEMBLED TOGETHER, THIS MODULE MUST BE MOUNTED NEXT TO THE SUBPLATE OR MOUNTING SURFACE TO ACCOMMODATE THE EXTERNAL DRAIN ("Y" PORT).

MODEL CODE BREAKDOWN

(F3) DGR - 06 - *2 - 52

- (F3) — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- D — DIRECTIONAL CONTROL
- G — MANIFOLD OR SUBPLATE MOUNTED
- R — SEQUENCE MODULE
- 06 — 3/4 INCH SIZE
- * — PRESSURE RANGE

A - 80- 250 PSI	X - 10- 30 PSI
B - 125- 500 PSI	Y - 30- 60 PSI
D - 250-1000 PSI	Z - 60-125 PSI
F - 475-2000 PSI	

- 2 — MODULE ACTION (DIRECTLY OPERATED-EXTERNALLY DRAINED)
- 52 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

MODULAR PRESSURE REDUCING VALVES

(F3)DGX-06-**(*)-60

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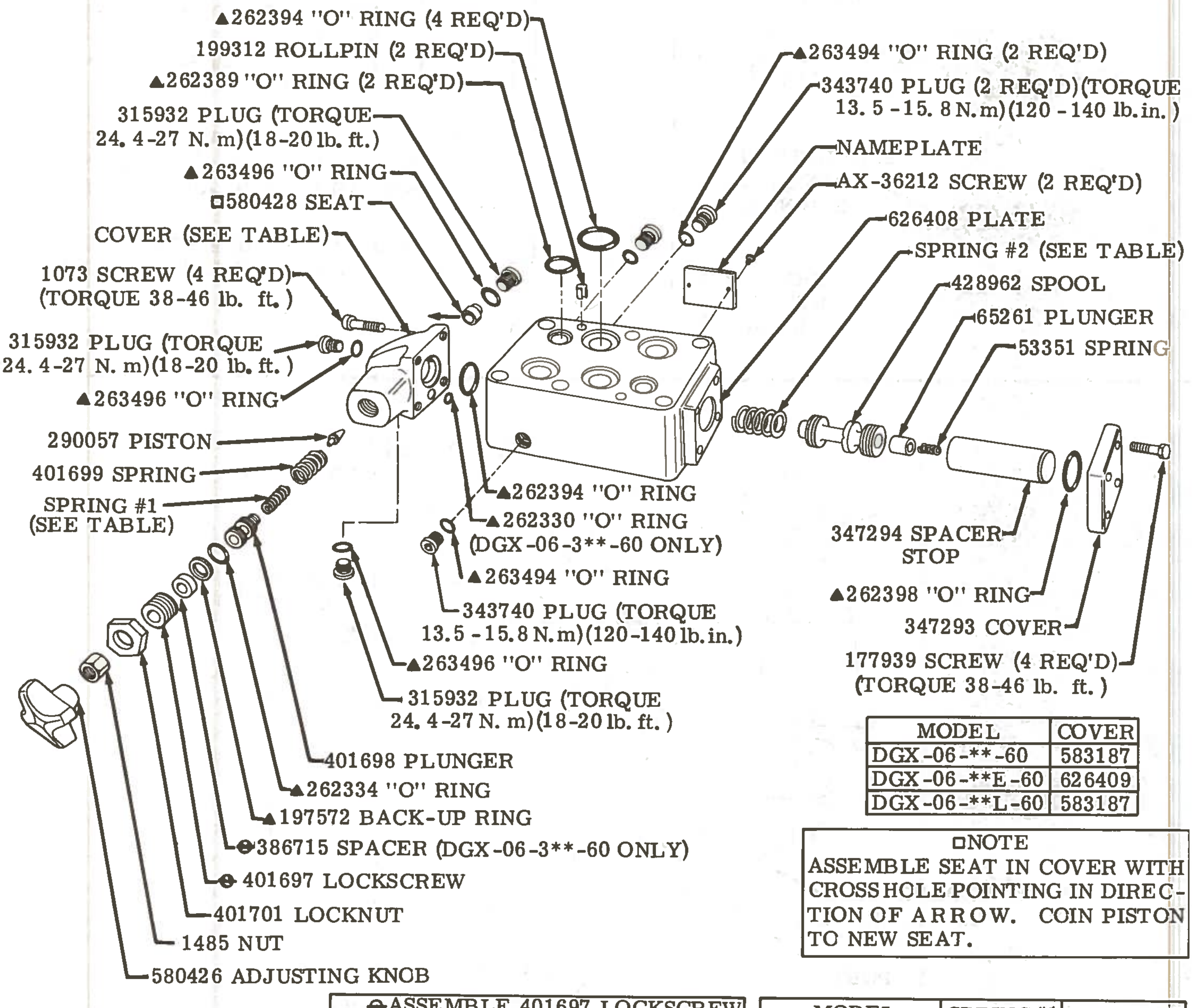


MODEL	COVER
DGX-06-**-60	583187
DGX-06-**E-60	626409
DGX-06-**L-60	583187

◘NOTE
ASSEMBLE SEAT IN COVER WITH CROSS HOLE POINTING IN DIRECTION OF ARROW. COIN PISTON TO NEW SEAT.

⊖ASSEMBLE 401697 LOCKSCREW WITH STEPPED O.D. END TOWARD 386715 SPACER OR PLUNGER.

MODEL	SPRING #1	SPRING #2
DGX-06-1**-60	2280	———
DGX-06-2**-60	583937	
DGX-06-3**-60	401700	
DGX-06-*B*-60	———	322653
DGX-06-*F*-60		348614

▲SERVICE ALL UNITS W/F3 SEAL KIT 920126

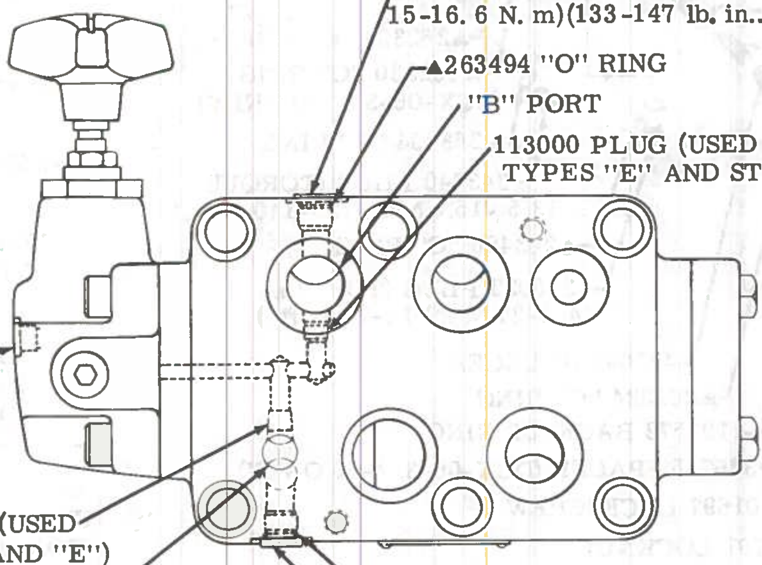
CAUTION
THIS VALVE CANNOT BE USED WITH PRESSURE CENTERED VALVES.

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

(F3) DGX - 06 - ** (*) - 60

- (F3) — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- D — DIRECTIONAL CONTROL
- G — SUBPLATE OR MANIFOLD MOUNTED
- X — PRESSURE REDUCING MODULE
- 06 — 06 - 3/4 INCH SIZE
- * — MAXIMUM ADJUSTABLE PRESSURE
  1 - 1000 PSI, 2 - 2000 PSI, 3 - 2850 PSI
- * — USGPM MAXIMUM FLOW CAPACITY
  B - 06-15 80 PSI MIN. ADJ. PRESS.
  F - 06-30 200 PSI MIN. ADJ. PRESS.
- (*) — (OMITTED) STD. EXT. DRAINED TO "Y" PORT.
  TYPE "E" EXT. DRAINED THRU COVER.
  TYPE "L" INT. DRAINED TO "B" PORT.
- 60 — DESIGN



To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

Litho in U. S. A.

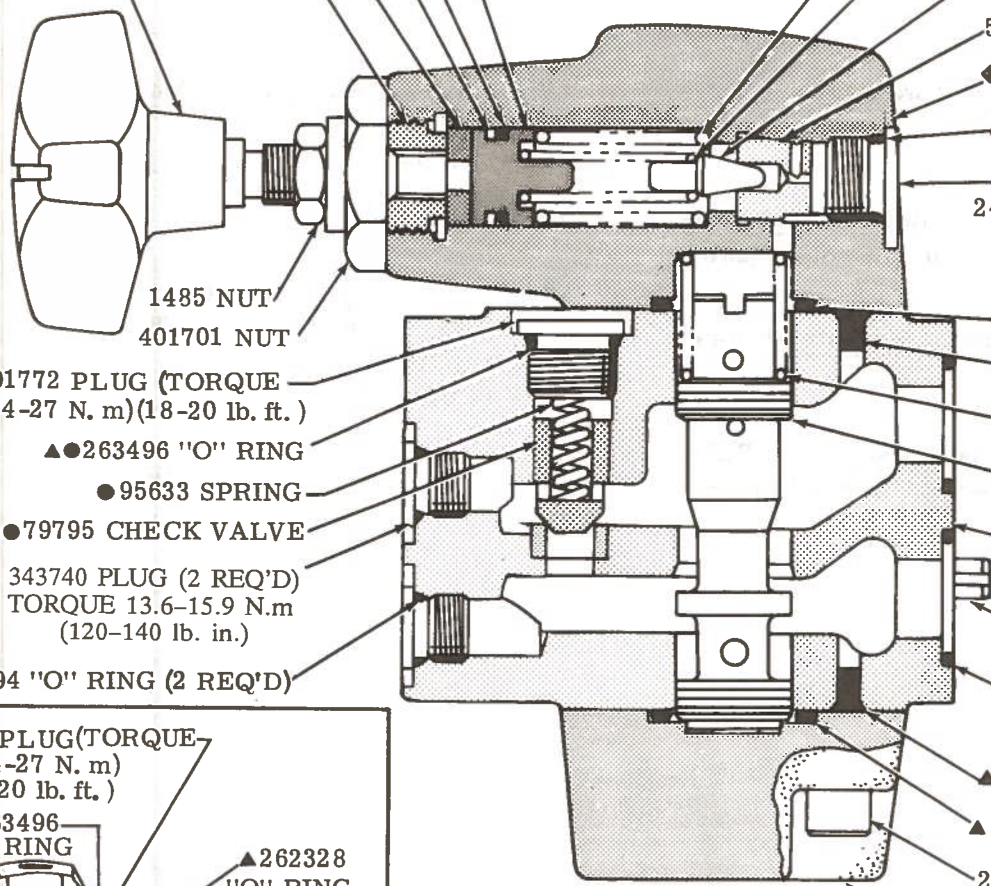
Service Parts Information

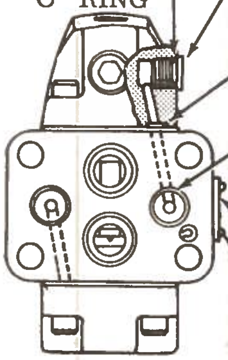
VICKERS®
A TRINOVA COMPANY

PRESSURE REDUCING VALVES

X(C)G-(H)03-**-30

MODEL	SPOOL S/A	MAIN SPRING
X*G-03-*B-30	428816	428817
X*G-03-*F-30	428816	428818
X*G-H03-*-30	590345	587247





●XC* MODELS ONLY

◆NOT AVAILABLE FOR SALE

▲SERVICE ALL UNITS W/F3 SEAL KIT 919836

⊖INSTALL LOCKSCREW WITH STEPPED O. D. END TOWARD SPACER OR PLUNGER AS SHOWN.

MODEL	COVER SPRING	SPACER	MAXIMUM P. S. I.
X*G-(H)03-1-30	2280	———	1000
X*G-(H)03-2-30	583937		2000
X*G-(H)03-3-30	401700	386715	2850

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

(F3) – X (C) G – (H) 03 – * * – 30

[1] [2] [3] [4] [5] [6] [7] [8] [9]

[1] Seals For Mineral Oil & Fire Resistant Fluids

[2] Pressure Reducing Valve

[3] Integral Check Valve
(Omit if not Required)

[4] Manifold or Subplate Mounted

[5] Rated Flow – 30 USGPM
(Omit for 'B' & 'F' Models)

[6] Nominal Valve Size – 3/8 Inch

[7] Maximum Adjustable Pressure
1 – 1000 PSI
2 – 2000 PSI
3 – 2850 PSI

[8] Rated Flow
(Omit for High Flow 'H' Models)
B – 7 USGPM
F – 14 USGPM

[9] Design

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR, and OFRS series filters are recommended.

Litho in U.S.A.

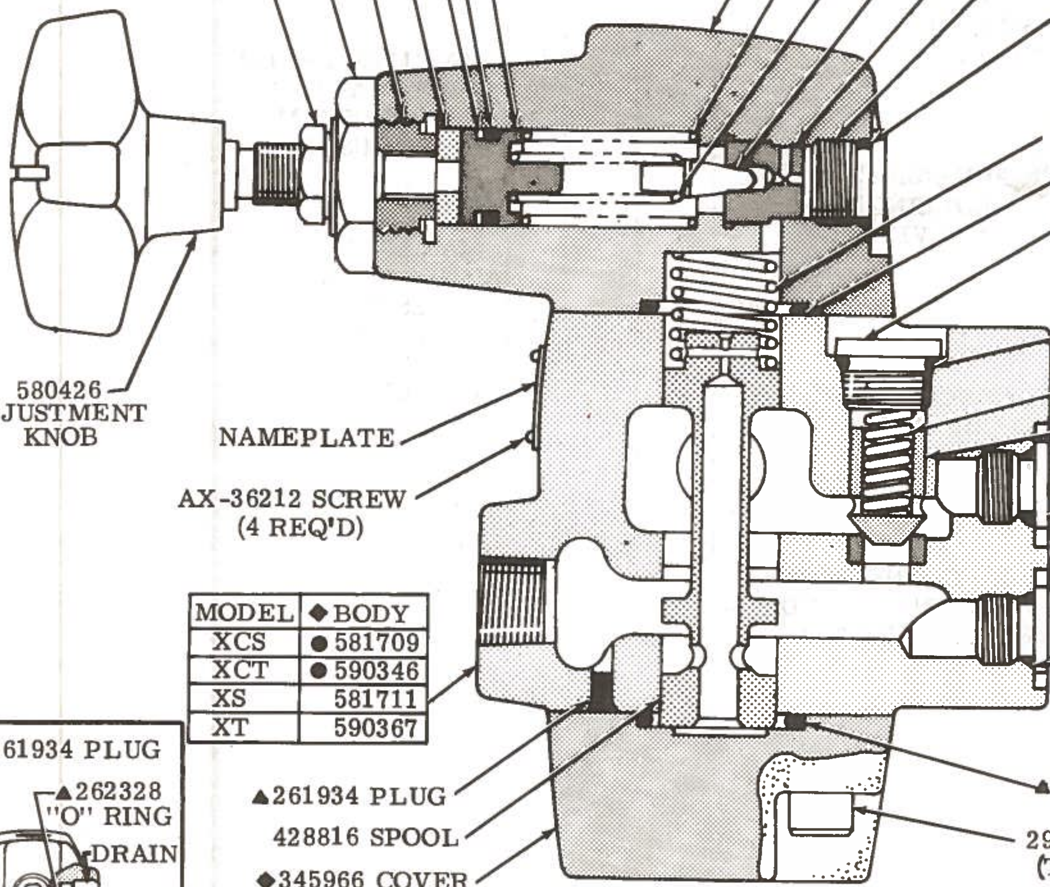
Service Parts Information

VICKERS®
A TRINOVA COMPANY

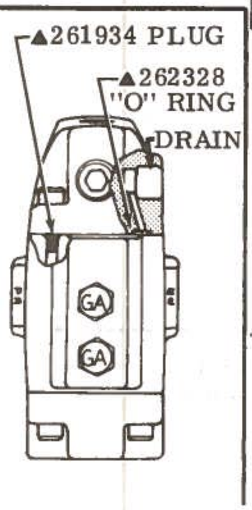
PRESSURE REDUCING VALVES

X(C)T-03-**-30

X(C)S-03-**-30



MODEL	◆BODY
XCS	● 581709
XCT	● 590346
XS	581711
XT	590367



▲SERVICE ALL UNITS W/F3 SEAL KIT 919836

⊖INSTALL LOCKSCREW WITH STEPPED O. D. END TOWARD SPACER OR PLUNGER AS SHOWN.

●FOR XCS & XCT MODELS ONLY

◆NOT AVAILABLE FOR SALE

MODEL	SPRING	COVER SPRING	SPACER	PRESSURE RANGE PSI	RATED FLOW USGPM
X(C)*-03-1B-30	428817	2280	——	75-1000	7
X(C)*-03-1F-30	428818			150-1000	14
X(C)*-03-2B-30	428817	583937		75-2000	7
X(C)*-03-2F-30	428818			150-2000	14
X(C)*-03-3F-30		401700	386715	150-2850	

MODEL CODE BREAKDOWN

(F3) - X (C) * -03 - ** - 30

- **(F3)** — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- **X** — PRESSURE REDUCING VALVE
- **(C)** — INTEGRAL CHECK VALVE
OMITTED-NO CHECK VALVE
- ***** — THREADED CONNECTIONS
S - .750-16 UNF-2B THD.
T - 3/8 INCH NPTF THD.
- **03** — NOMINAL VALVE SIZE 3/8 INCH
- ***** (first) — MAXIMUM ADJUSTABLE PRESSURE
1 - 1000 PSI
2 - 2000 PSI
3 - 3000 PSI
- ***** (second) — MAXIMUM RATED FLOW CAPACITY
B - 7 USGPM
F - 14 USGPM
- **30** — DESIGN

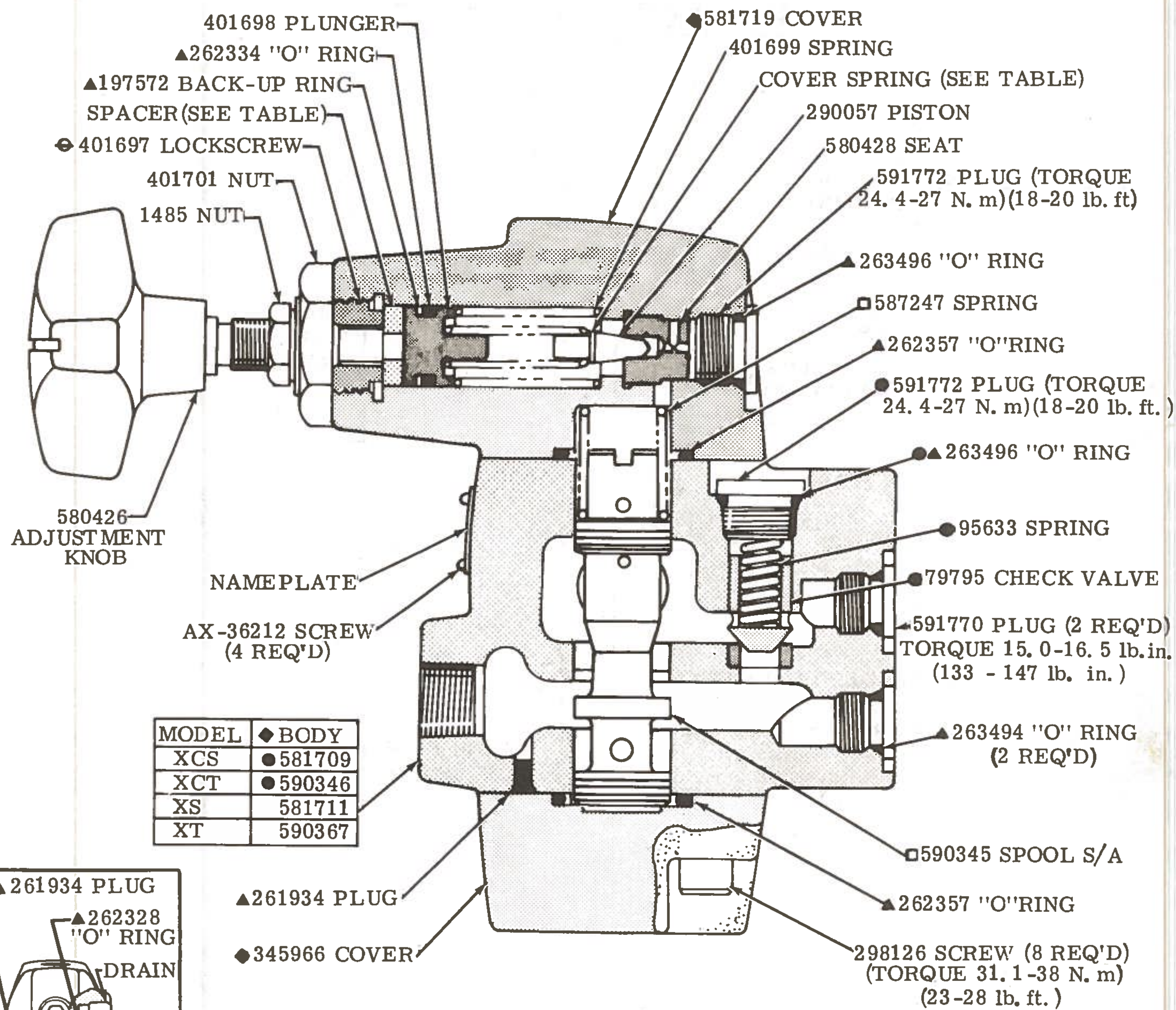
To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

Service Parts Information

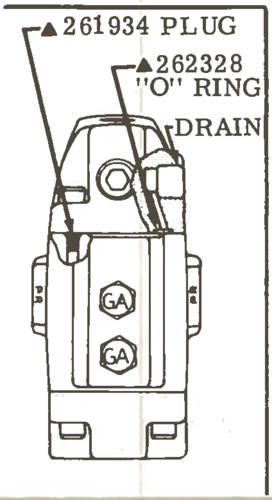
VICKERS®
A TRINOVA COMPANY

PRESSURE REDUCING VALVES

X(C)T-H03-*-30
X(C)S-H03-*-30



MODEL	◆BODY
XCS	●581709
XCT	●590346
XS	581711
XT	590367



●FOR XC* MODELS ONLY

◆NCT AVAILABLE FOR SALE

▲SERVICE ALL UNITS W/F3 SEAL KIT 919836

□INCLUDED IN SPOOL S/A KIT 941389

⊖NOTE
INSTALL LOCKSCREW WITH STEPPED O. D. END TOWARD SPACER OR PLUNGER AS SHOWN.

MODEL	COVER SPRING	SPACER	MAXIMUM P. S. I.
X(C)*-H03-1-30	2280		1000
X(C)*-H03-2-30	583937		2000
X(C)*-H03-3-30	401700	386715	2850

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

(F3)-X(C)*-H03-*-30

- (F3) — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- X — PRESSURE REDUCING VALVE
- (C) — INTEGRAL CHECK VALVE
- * — THREADED CONNECTIONS
  S -.750-16 UNF-2B THD.
  T - 3/8 INCH NPTF THD.
- H — HIGH FLOW 30 USGPM
- 03 — NOMINAL VALVE SIZE 3/8 INCH
- * — MAXIMUM ADJUSTABLE PRESSURE
  1 - 1000 PSI
  2 - 2000 PSI
  3 - 2850 PSI
- 30 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, CFR, and OFRS series are recommended.

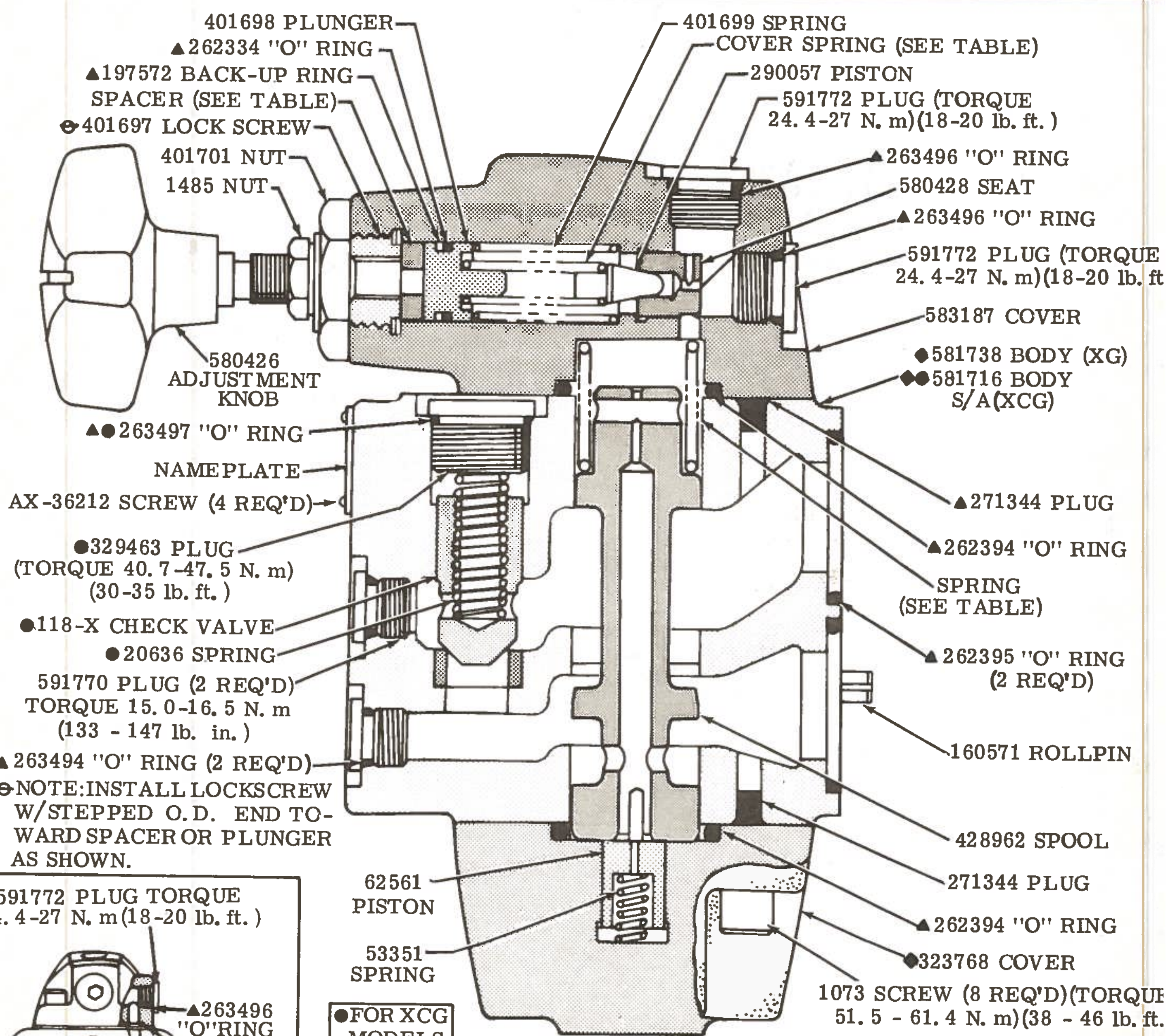
Litho in U.S.A.

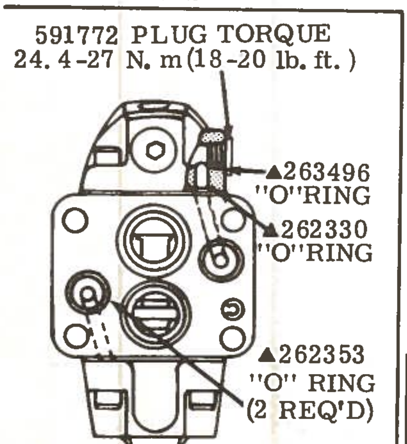
Service Parts Information

VICKERS®
A TRINOVA COMPANY

PRESSURE REDUCING VAVES

X(C)G-06--30**





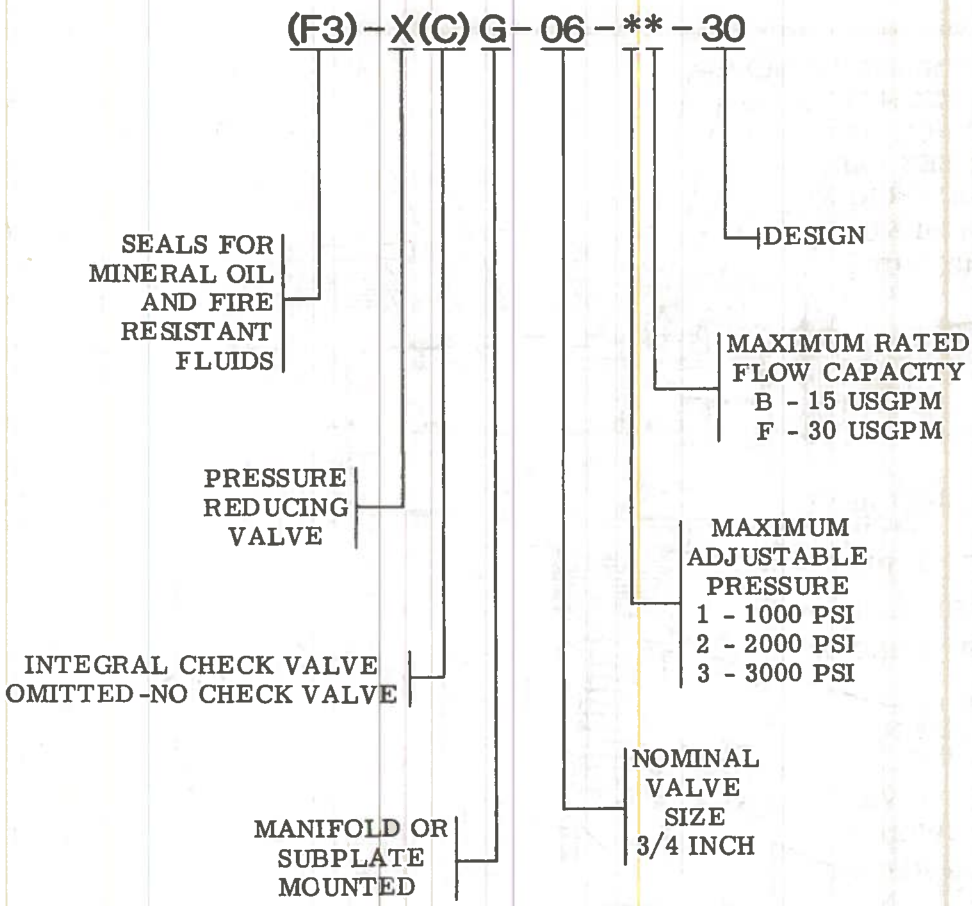
●FOR XCG MODELS ONLY

◆NOT AVAILABLE FOR SALE

▲SERVICE ALL UNITS W/F3 SEAL KIT 919615

MODEL	SPRING	COVER SPRING	SPACER	PRESS RANGE P.S.I.	RATED FLOW USGPM
X(C)G-06-1B-30	322653	2280	——	80-1000	15
X(C)G-06-1F-30	348614			200-1000	30
X(C)G-06-2B-30	322653	583937		80-2000	15
X(C)G-06-2F-30	348614			200-2000	30
X(C)G-06-3B-30	322653	401700	386715	200-2850	15
X(C)G-06-3F-30	348614				30

MODEL CODE BREAKDOWN



To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

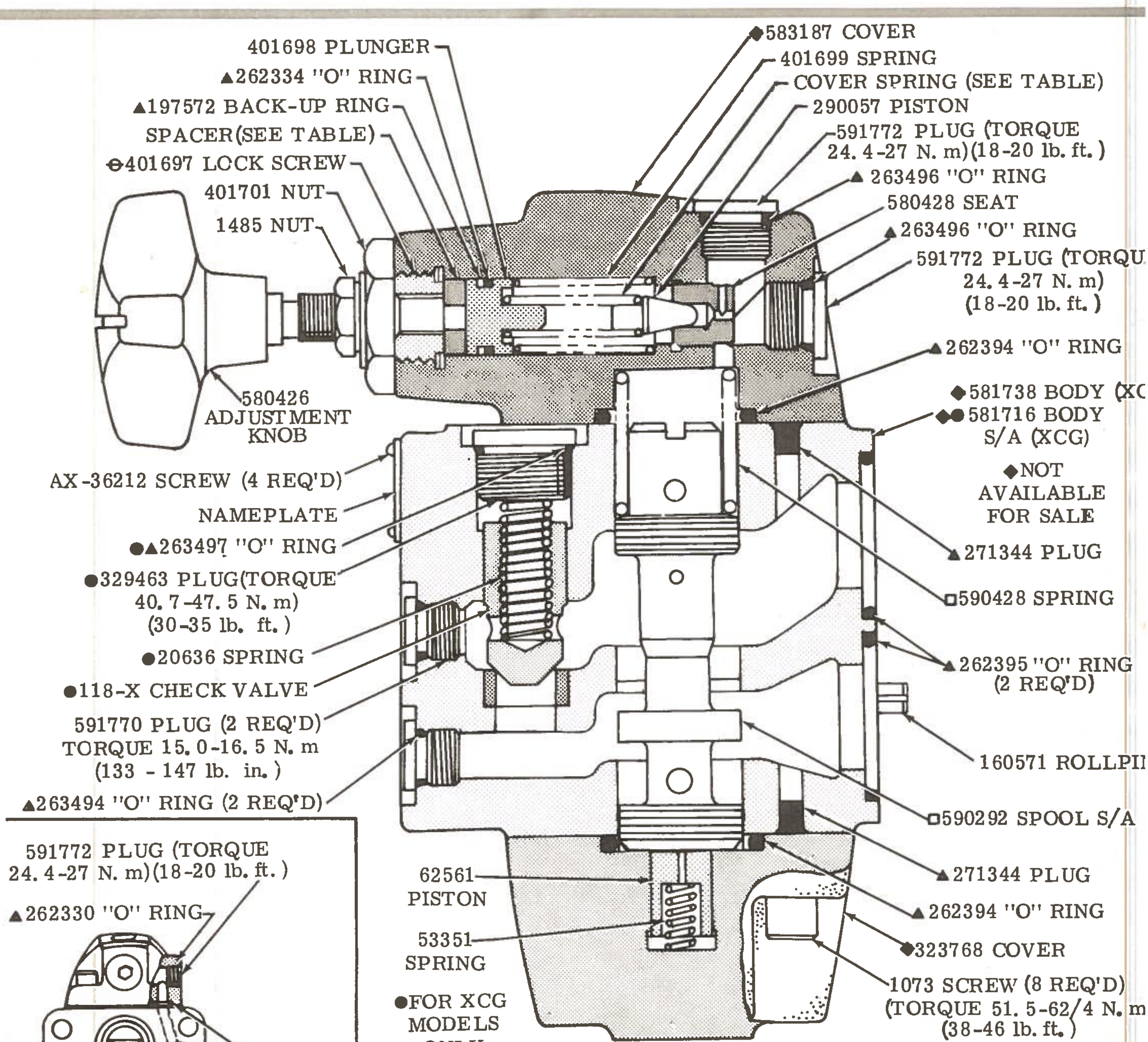
Litho in U. S. A.

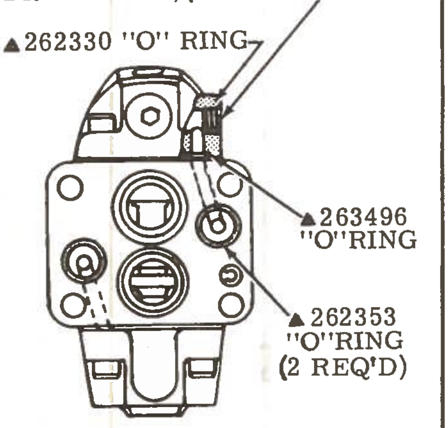
Service Parts Information

VICKERS®
A TRINOVA COMPANY

PRESSURE REDUCING VALVES

X(C)G-H06-**-30





□INCLUDED IN SPOOL S/A KIT 941390

▲SERVICE ALL UNITS W/F3 SEAL KIT 919615

MODEL	COVER SPRING	SPACER	MAXIMUM P.S.I.
X(C)G-H06-1-30	2280	———	1000
X(C)G-H06-2-30	583937		2000
X(C)G-H06-3-30	401700	386715	2850

⊖NOTE: INSTALL LOCKSCREW WITH STEPPED O.D END TOWARD SPACER OR PLUNGER AS SHOWN.

MODEL CODE BREAKDOWN

(F3)-X(C)G-H06-*-30

- **(F3)** — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- **X** — PRESSURE REDUCING VALVE
- **(C)** — INTEGRAL CHECK VALVE / OMITTED-NO CHECK VALVE
- **G** — MANIFOLD OR SUBPLATE MOUNTED
- **H** — HIGH FLOW 70 USGPM
- **06** — NOMINAL VALVE SIZE 3/4 INCH
- ***** — MAXIMUM ADJUSTABLE PRESSURE
  - 1 - 1000 PSI
  - 2 - 2000 PSI
  - 3 - 2850 PSI
- **30** — DESIGN

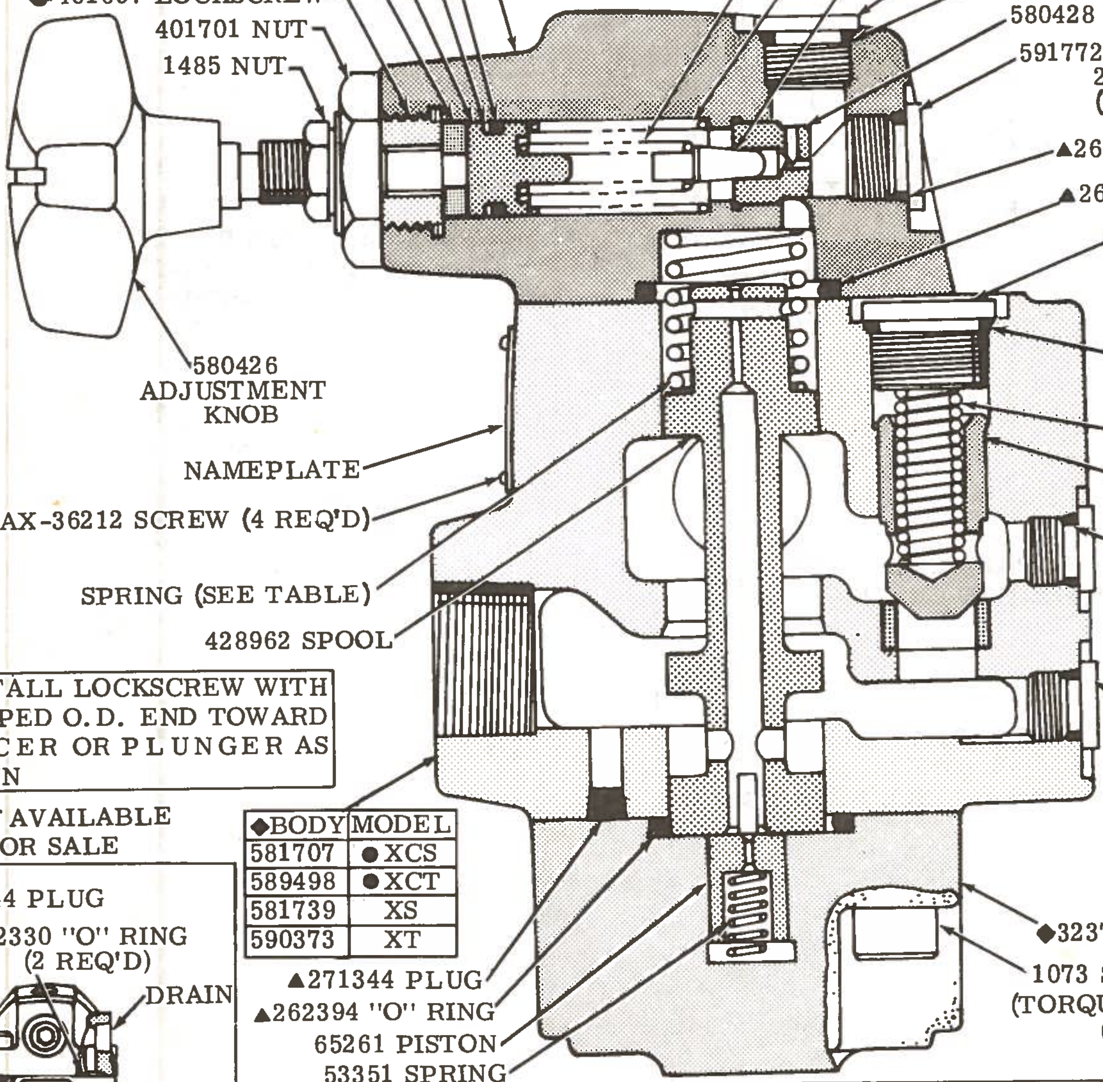
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

PRESSURE REDUCING VALVES

X(C)S-06--30**
X(C)T-06--30**

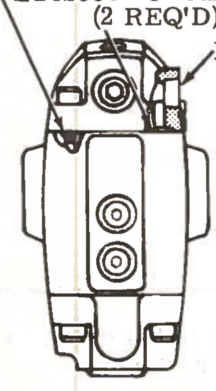
VICKERS®
A TRINOVA COMPANY



⊖INSTALL LOCKSCREW WITH STEPPED O.D. END TOWARD SPACER OR PLUNGER AS SHOWN

◆NOT AVAILABLE FOR SALE

◆BODY	MODEL
581707	●XCS
589498	●XCT
581739	XS
590373	XT



●XC* MODELS ONLY

▲SERVICE ALL UNITS W/F3 SEAL KIT 919615

MODEL	SPRING	COVER SPRING	SPACER	PRESS. RANGE P.S.I.	FLOW RATE USGPM
X(C)*-06-1B-30	322653	2280		80-1000	15
X(C)*-06-1F-30	348614			200-1000	30
X(C)*-06-2B-30	322653	583937		80-2000	15
X(C)*-06-2F-30	348614			200-2000	30
X(C)*-06-3B-30	322653	401700	386715	200-2850	15
X(C)*-06-3F-30	348614				30

MODEL CODE BREAKDOWN

(F3) X (C) * - 06 - * * - 30

- (F3) — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- X — PRESSURE REDUCING VALVE
- (C) — INTEGRAL CHECK VALVE OMITTED-NO CHECK VALVE
- * — THREADED CONNECTIONS
  - S - 1. 0625-12UN-2B THD.
  - T - 3/4 INCH NPTF THD.
- 06 — NOMINAL VALVE SIZE 3/4 INCH
- * — MAXIMUM ADJUSTABLE PRESSURE
  - 1 - 1000 PSI
  - 2 - 2000 PSI
  - 3 - 3000 PSI
- * — MAXIMUM RATED FLOW CAPACITY
  - B - 15 USGPM
  - F - 30 USGPM
- 30 — DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

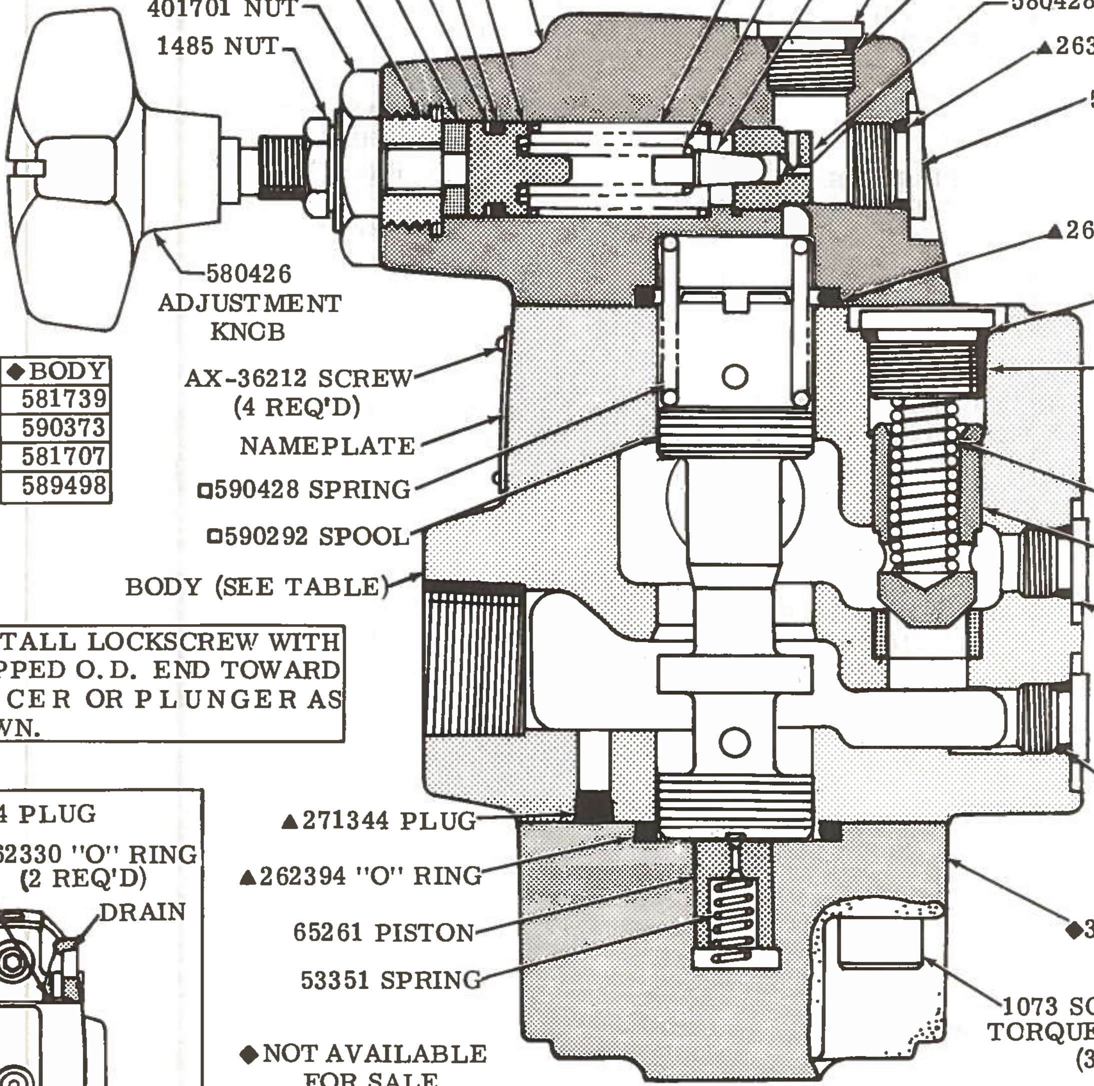
Service Parts Information

VICKERS®
A TRINOVA COMPANY

PRESSURE REDUCING VALVES

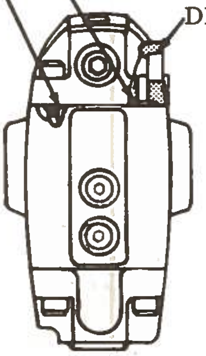
X(C)T-H06-*-30

X(C)S-H06-*-30



MODEL	◆BODY
XS	581739
XT	590373
● XCS	581707
● XCT	589498

⊖INSTALL LOCKSCREW WITH STEPPED O.D. END TOWARD SPACER OR PLUNGER AS SHOWN.



◆NOT AVAILABLE FOR SALE

●XC* MODELS ONLY

□INCLUDED IN SPOOL S/A KIT 941390.

▲SERVICE ALL UNITS W/F3 SEAL KIT 919615

MODEL	COVER SPRING	SPACER	MAXIMUM P. S. I.
X(C)*-H06-1-30	2280	——	1000
X(C)*-H06-2-30	583937		2000
X(C)*-H06-3-30	401700	386715	2850

MODEL CODE BREAKDOWN

(F3) X (C) * - H 06 - * - 30

(F3) — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS

X — PRESSURE REDUCING VALVE

(C) — INTEGRAL CHECK VALVE
OMITTED-NO CHECK VALVE

* — THREADED CONNECTIONS
S - 1.0625-12UN-2B THD.
T - 3/4 INCH NPTF THD.

H — HIGH FLOW
70 USGPM

06 — NOMINAL VALVE SIZE
3/4 INCH

* — MAXIMUM ADJUSTABLE PRESSURE
1 - 1000 PSI
2 - 2000 PSI
3 - 2850 PSI

30 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

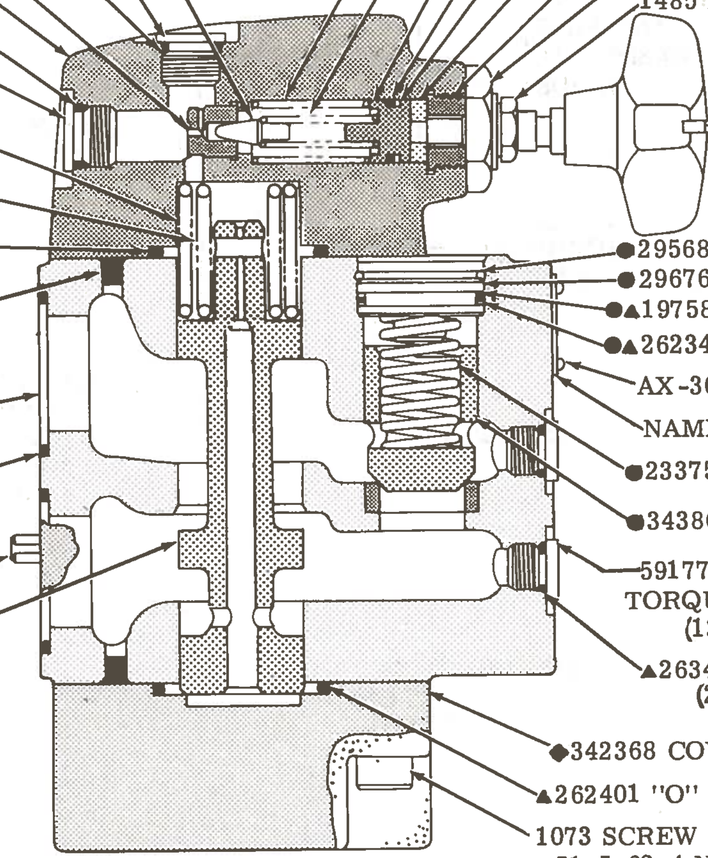
Litho in U. S. A.

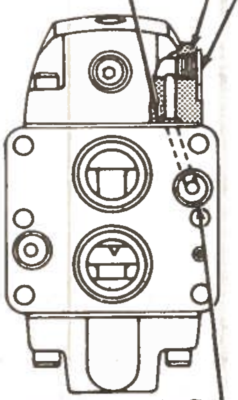
Service Parts Information

VICKERS® A TRINOVA COMPANY

PRESSURE REDUCING VALVES

X(C)G-10-**-30





●XCG MODELS ONLY

◆NOT AVAILABLE FOR SALE

MODEL	INNER SPRING	COVER SPRING	SPACER	PRESS RANGE PSI	FLOW RATE GPM
X(C)G-10-1B-30	———	2280	———	100-1000	25
				165-1000	50
X(C)G-10-1F-30	428961			225-1000	75
X(C)G-10-2B-30	———	583937		100-2000	25
				165-2000	50
X(C)G-10-2F-30	428961			225-2000	75
X(C)G-10-3F-30		401700	386715	225-2850	75

▲SERVICE ALL UNITS W/F3 SEAL KIT 919852

⊖INSTALL LOCKSCREW WITH STEPPED O. D. END TOWARD SPACER OR PLUNGER

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

(F3) X (C) G - 10 - ** - 30

- (F3) — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- X — PRESSURE REDUCING VALVE
- (C) — INTEGRAL CHECK VALVE
- G — MANIFOLD OR SUBPLATE MOUNTED
- 10 — NOMINAL VALVE SIZE 1 - $\frac{1}{4}$ INCH
- First * — MAXIMUM ADJUSTABLE PRESSURE
  - 1 - 1000 PSI
  - 2 - 2000 PSI
  - 3 - 2850 PSI
- Second * — MAXIMUM RATED FLOW CAPACITY
  - B - 50 USGPM
  - F - 75 USGPM
- 30 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

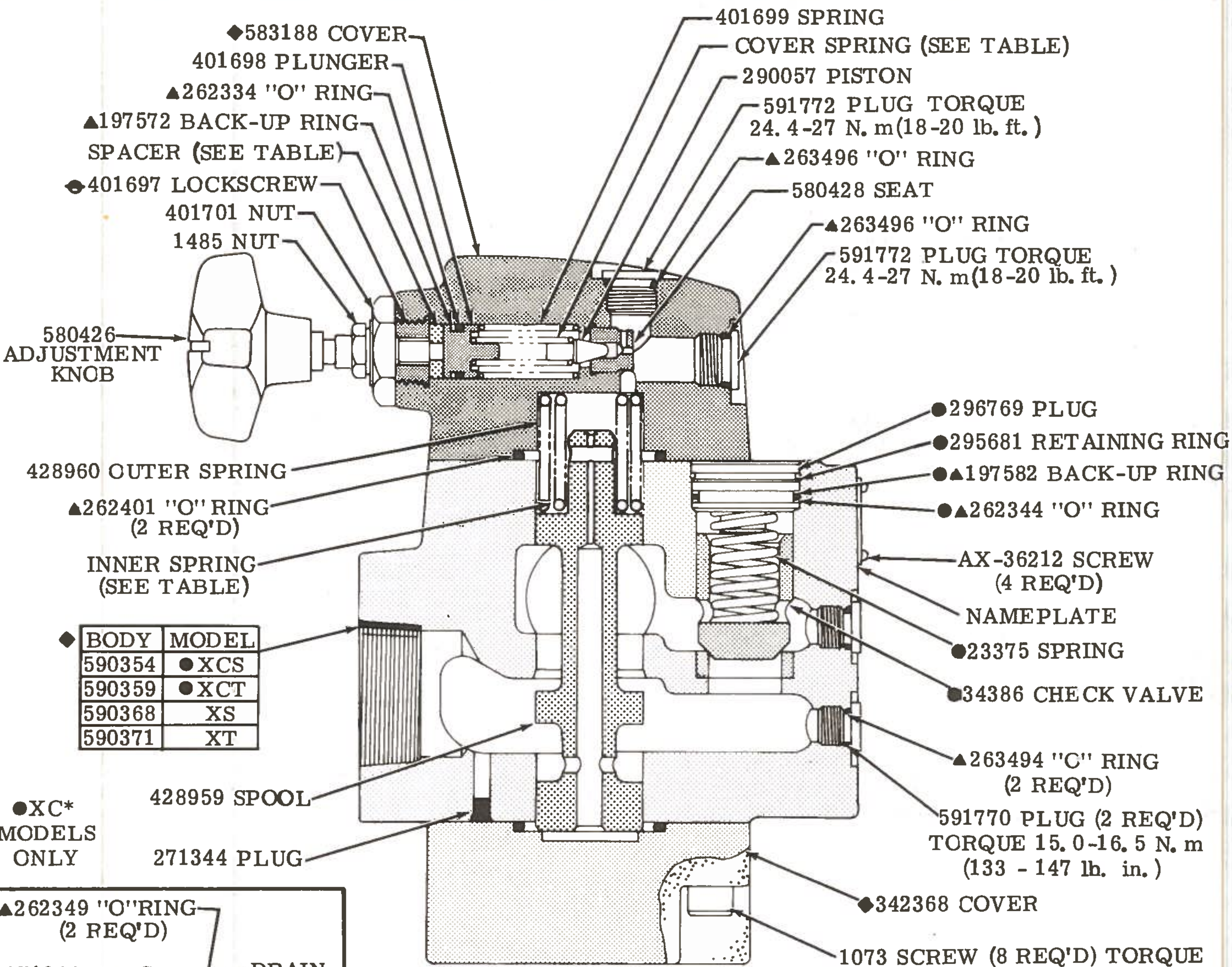
Service Parts Information

VICKERS®
A TRINOVA COMPANY

PRESSURE REDUCING VALVES

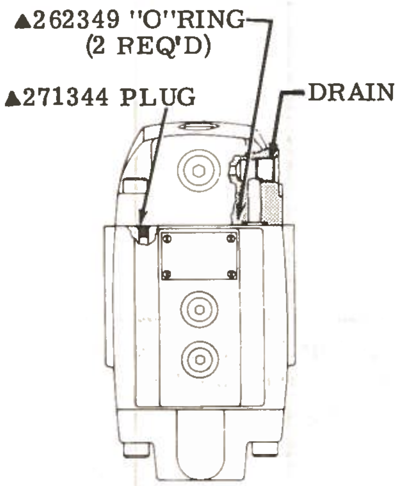
X(C)T-10-**-30

X(C)S-10-**-30



◆ BODY	MODEL
590354	●XCS
590359	●XCT
590368	XS
590371	XT

●XC* MODELS ONLY



◆NOT AVAILABLE FOR SALE

MODEL	INNER SPRING	COVER SPRING	SPACER	PRESSURE RANGE PSI	RATED FLOW USGPM
X(C)*-10-1B-30	——	2280	——	100-1000	25
				165-1000	50
X(C)*-10-1F-30	428961			225-1000	75
X(C)*-10-2B-30	——	583937		100-2000	25
				165-2000	50
X(C)*-10-2F-30	428961			225-2000	75
X(C)*-10-3F-30		401700	386715	225-2850	75

▲SERVICE ALL UNITS W/F3 SEAL KIT 919852

⊖INSTALL LOCKSCREW WITH STEPPED O. D. END TOWARD SPACER OR PLUNGER AS SHOWN

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

(F3) X(C)* - 10 - ** - 30

- **(F3)** — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- **X** — PRESSURE REDUCING VALVE
- **(C)** — INTEGRAL CHECK VALVE
OMITTED-NO CHECK VALVE
- ***** — THREADED CONNECTIONS
S - 1. 6250-12UN-2B THREAD
T - $1\frac{1}{4}$ INCH NPTF THREAD
- **10** — NOMINAL VALVE SIZE
$1\frac{1}{4}$ INCH
- ***** (first) — MAXIMUM ADJUSTABLE PRESSURE
1 - 1000 PSI
2 - 2000 PSI
3 - 2850 PSI
- ***** (second) — MAXIMUM RATED FLOW CAPACITY
B - 50 USGPM
F - 75 USGPM
- **30** — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

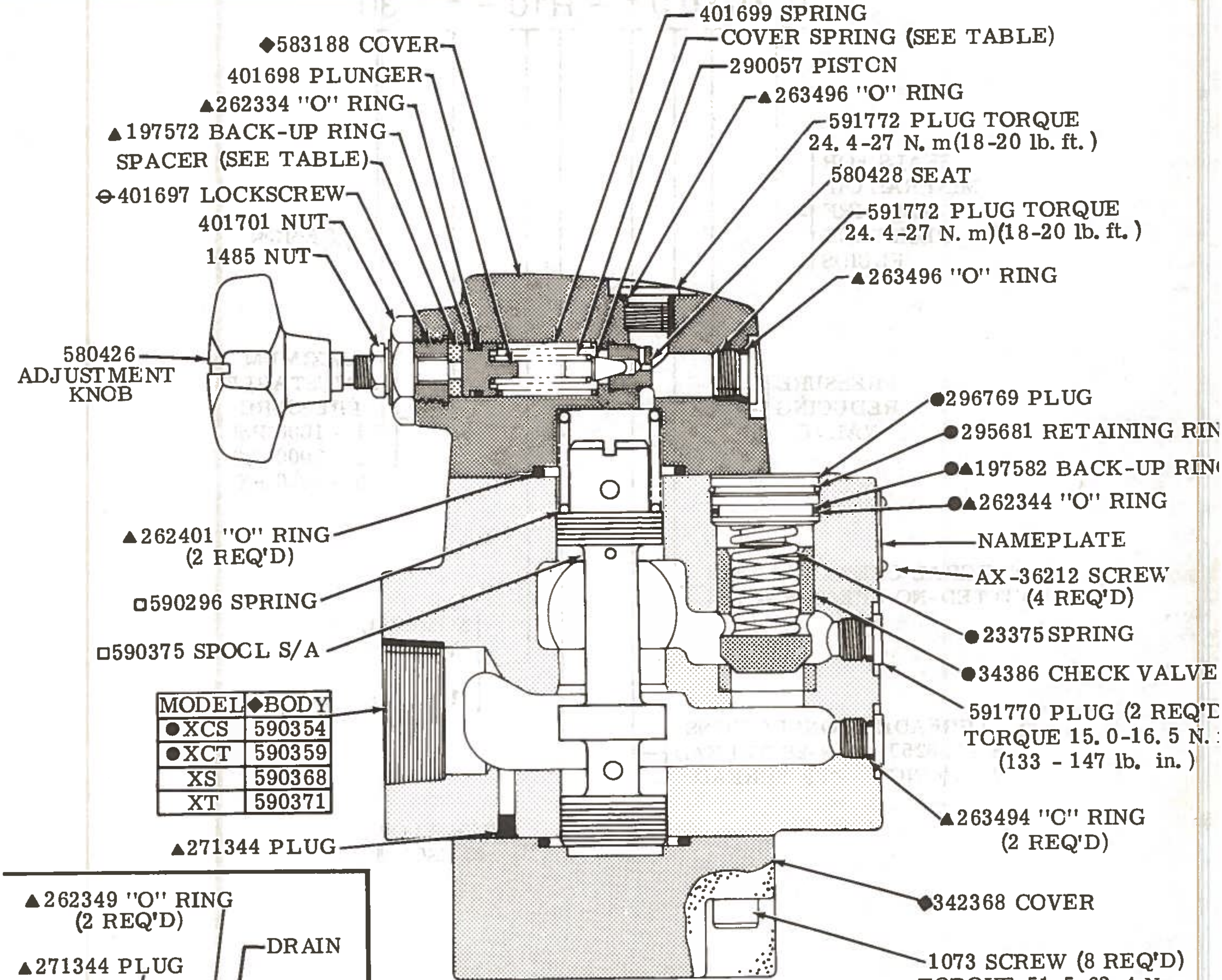
Service Parts Information

VICKERS®
A TRINOVA COMPANY

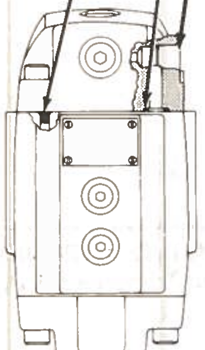
PRESSURE REDUCING VALVES

X(C)T-H10-*-30

X(C)S-H10-*-30



MODEL	◆BODY
●XCS	590354
●XCT	590359
XS	590368
XT	590371



●XC* MODELS ONLY

◆NOT AVAILABLE FOR SALE

▲SERVICE ALL UNITS W/F3 SEAL KIT 919852

□INCLUDED IN 941391 SPOOL S/A KIT

MODEL	COVER SPRING	SPACER	MAXIMUM P. S. I.
X(C)*-H10-1-30	2280	———	1000
X(C)*-H10-2-30	583937		2000
X(C)*-H10-3-30	401700	386715	2850

INSTALL LOCKSCREW WITH STEPPED O. END TOWARD SPACER OR PLUNGER A SHOWN

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

(F3) X(C) * - H10 - * - 30

- **(F3)** — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- **X** — PRESSURE REDUCING VALVE
- **(C)** — INTEGRAL CHECK VALVE
  OMITTED-NO CHECK VALVE
- ***** — THREADED CONNECTIONS
  S - 1. 6250-12UN-2B THREAD
  T - 1¼ INCH NPTF THREAD
- **H** — HIGH FLOW
  140 USGPM
- **10** — NOMINAL VALVE SIZE
  1¼ INCH
- ***** — MAXIMUM ADJUSTABLE PRESSURE
  1 - 1000 PSI
  2 - 2000 PSI
  3 - 2850 PSI
- **30** — DESIGN

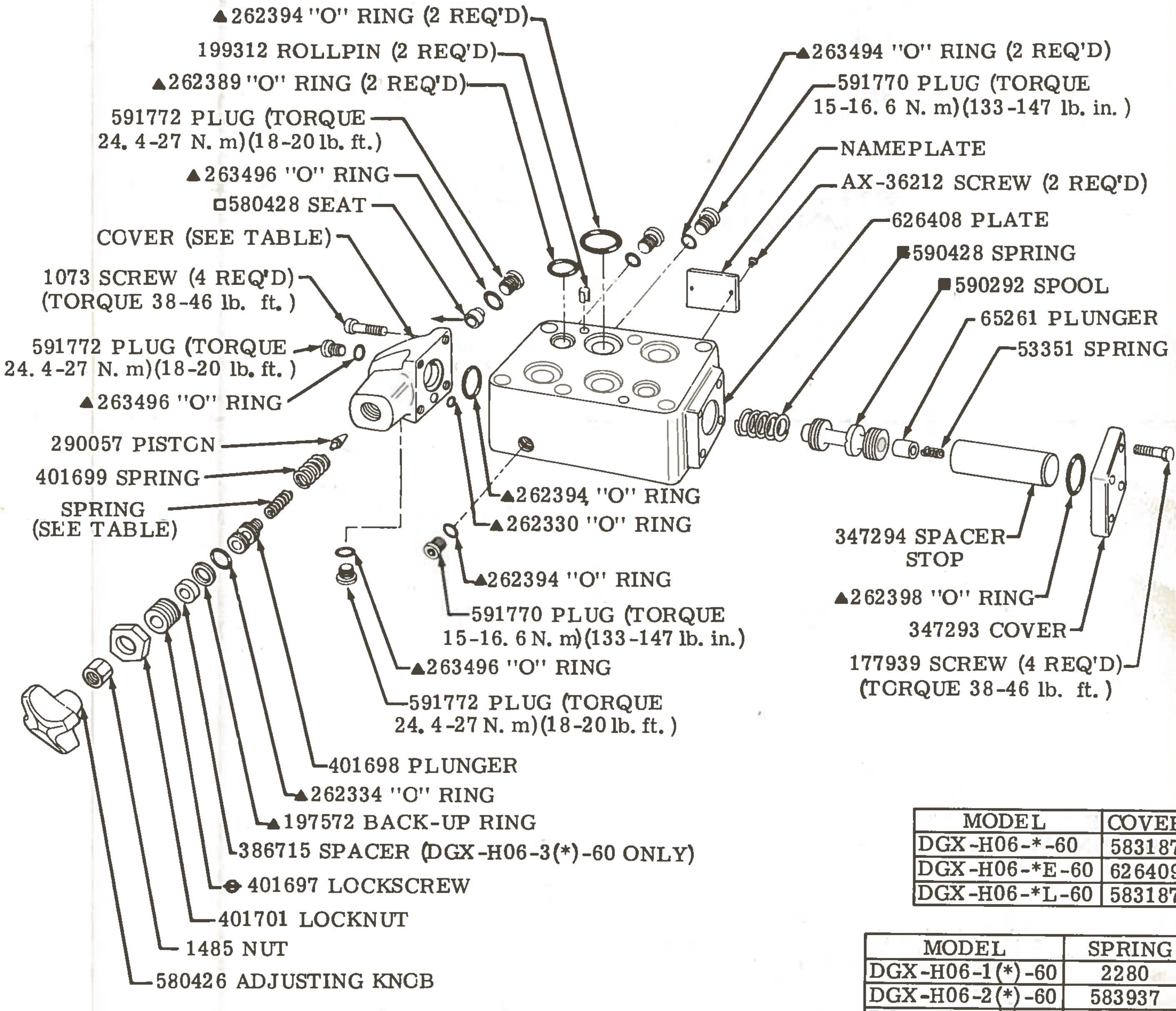
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

VICKERS®
A TRINOVA COMPANY

PRESSURE REDUCING VALVES

(F3)DGX-H06-*(*)-60



MODEL	COVER
DGX-H06-*-60	583187
DGX-H06-*E-60	626409
DGX-H06-*L-60	583187

MODEL	SPRING
DGX-H06-1(*)-60	2280
DGX-H06-2(*)-60	583937
DGX-H06-3(*)-60	401700

■ INCLUDED IN SPOOL KIT 941390

▲SERVICE ALL UNITS W/F3 SEAL KIT 920126

⊖ASSEMBLE 401697 LOCKSCREW WITH STEPPED O.D. END TOWARD 386715 SPACER OR PLUNGER.

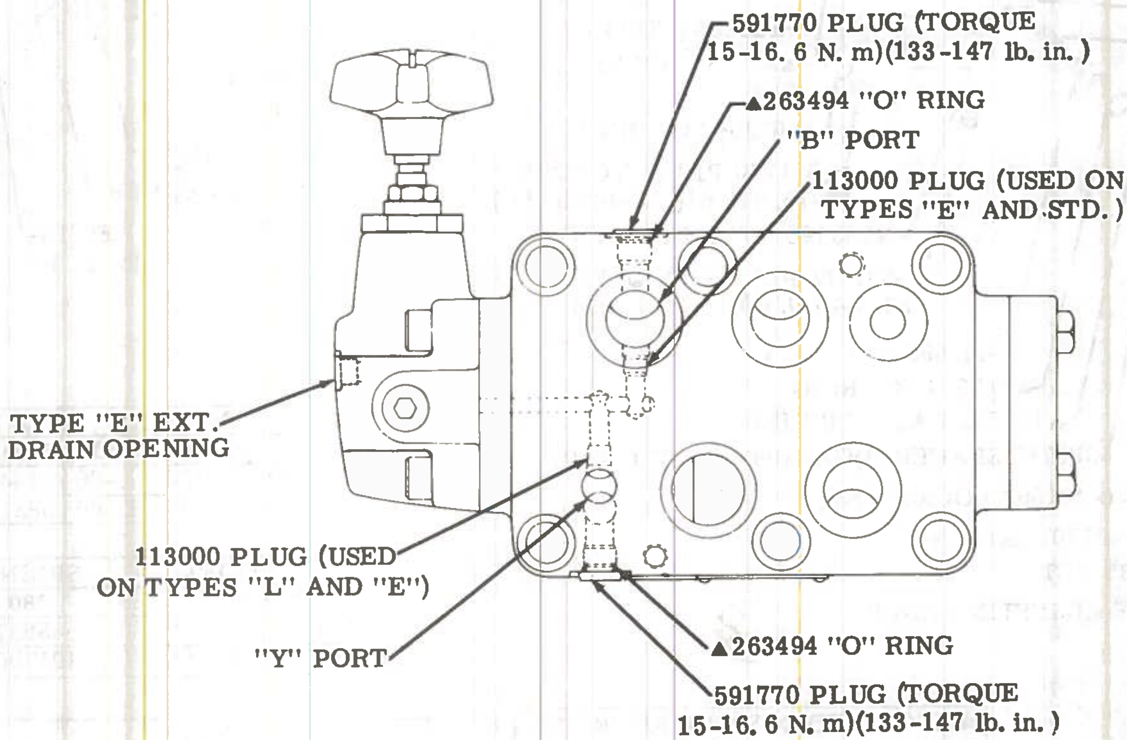
◻NOTE
ASSEMBLE SEAT IN COVER WITH CROSSHOLE POINTING IN DIRECTION OF ARROW. COIN PISTON TO NEW SEAT.

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

MODEL CODE BREAKDOWN

(F3) DGX - H06 - * (*) - 60

- (F3) — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- D — DIRECTIONAL CONTROL
- G — SUBPLATE OR MANIFOLD MOUNTED
- X — PRESSURE REDUCING MODULE
- H — HIGH FLOW CAPACITY 70 USGPM MODEL
- 06 — 06 - 3/4 INCH SIZE
- * — MAXIMUM ADJUSTABLE PRESSURE 1-1000 PSI, 2-2000 PSI, 3-2850 PSI
- (*) — (OMITTED) STD. EXT. DRAINED TO "Y" PORT. TYPE "E" EXT. DRAINED THRU COVER. TYPE "L" INT. DRAINED TO "B" PORT.
- 60 — DESIGN



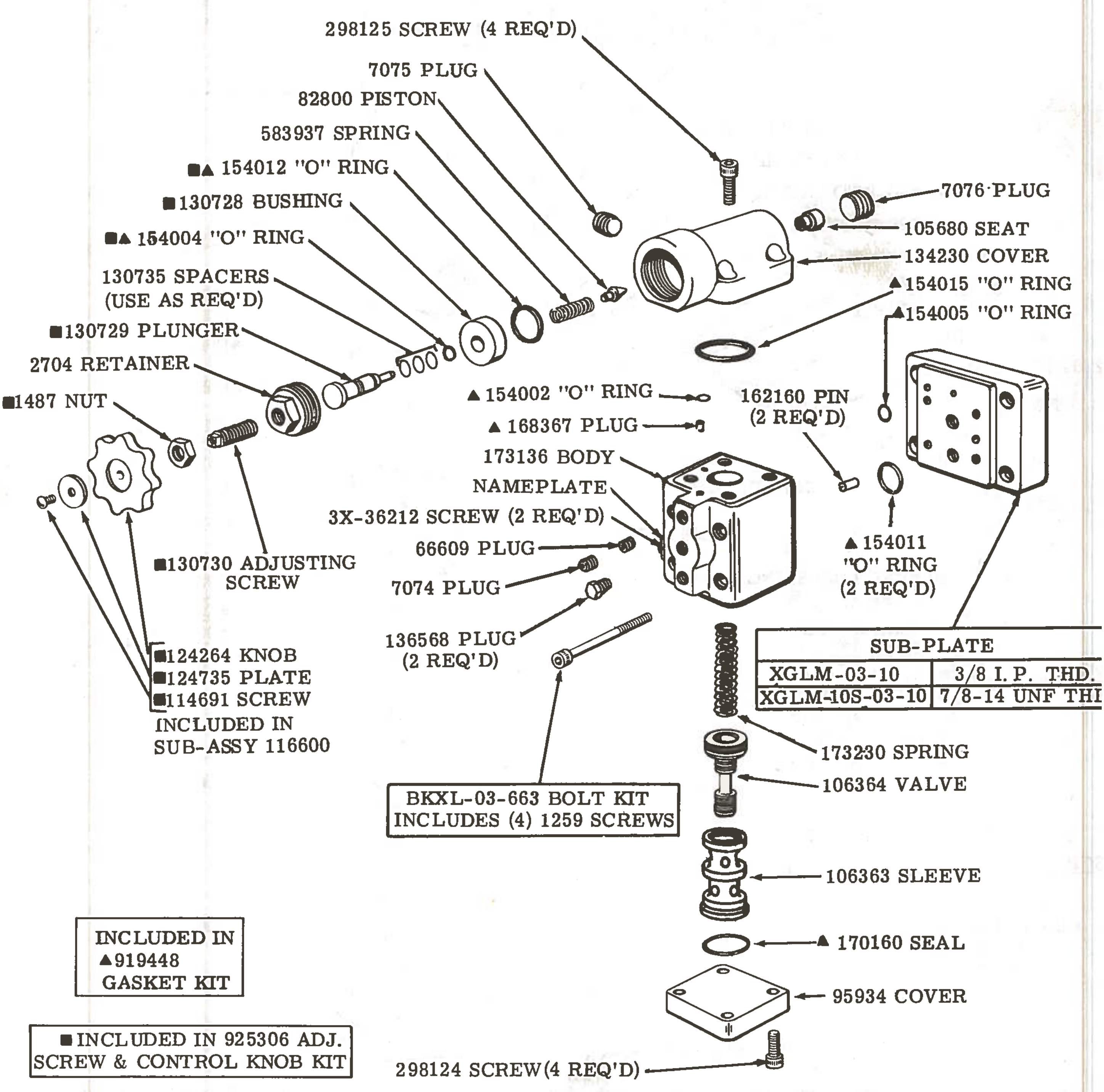
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

VICKERS®
A TRINOVA COMPANY

PRESSURE REDUCING VALVES

XGL-03-B-10
XSL-03-B-10
XTL-03-B-10



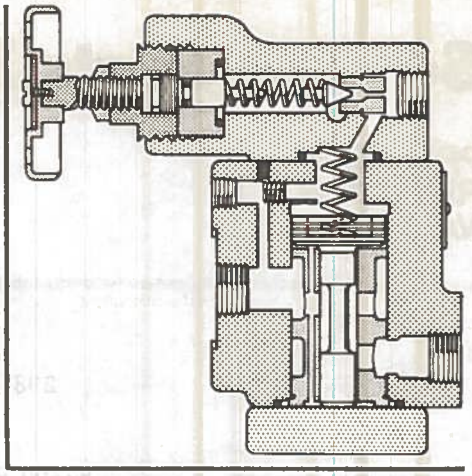
SUB-PLATE	
XGLM-03-10	3/8 I. P. THD.
XGLM-10S-03-10	7/8-14 UNF THI

INCLUDED IN ▲919448 GASKET KIT

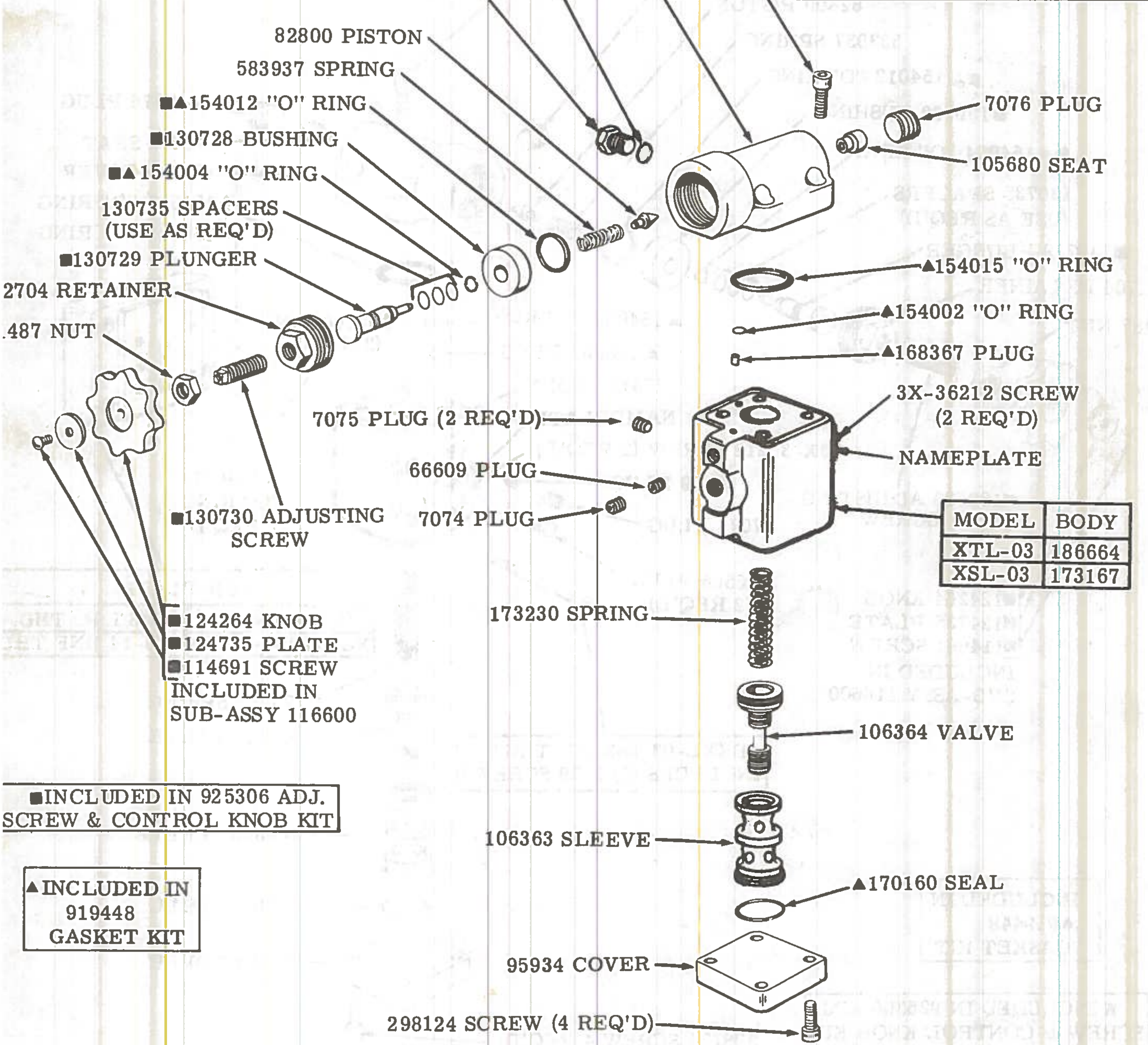
■ INCLUDED IN 925306 ADJ. SCREW & CONTROL KNOB KIT

XTL-03-B-10 NOMINAL PIPE THREAD 3/8"

XSL-03-B-10 14 SAE STRAIGHT THREAD 7/8"



MODEL	PLUG	SEAL	COVER	SCREW (4 REQ'D)
XTL-03	16127	—	134230	298125
XSL-03	191362	▲154128	191363	



MODEL	BODY
XTL-03	186664
XSL-03	173167

■INCLUDED IN 925306 ADJ. SCREW & CONTROL KNOB KIT

▲INCLUDED IN 919448 GASKET KIT

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

PRESSURE CONTROL VALVES

RF & RCF-16-*P*-10

RF & RCF-16-**-10

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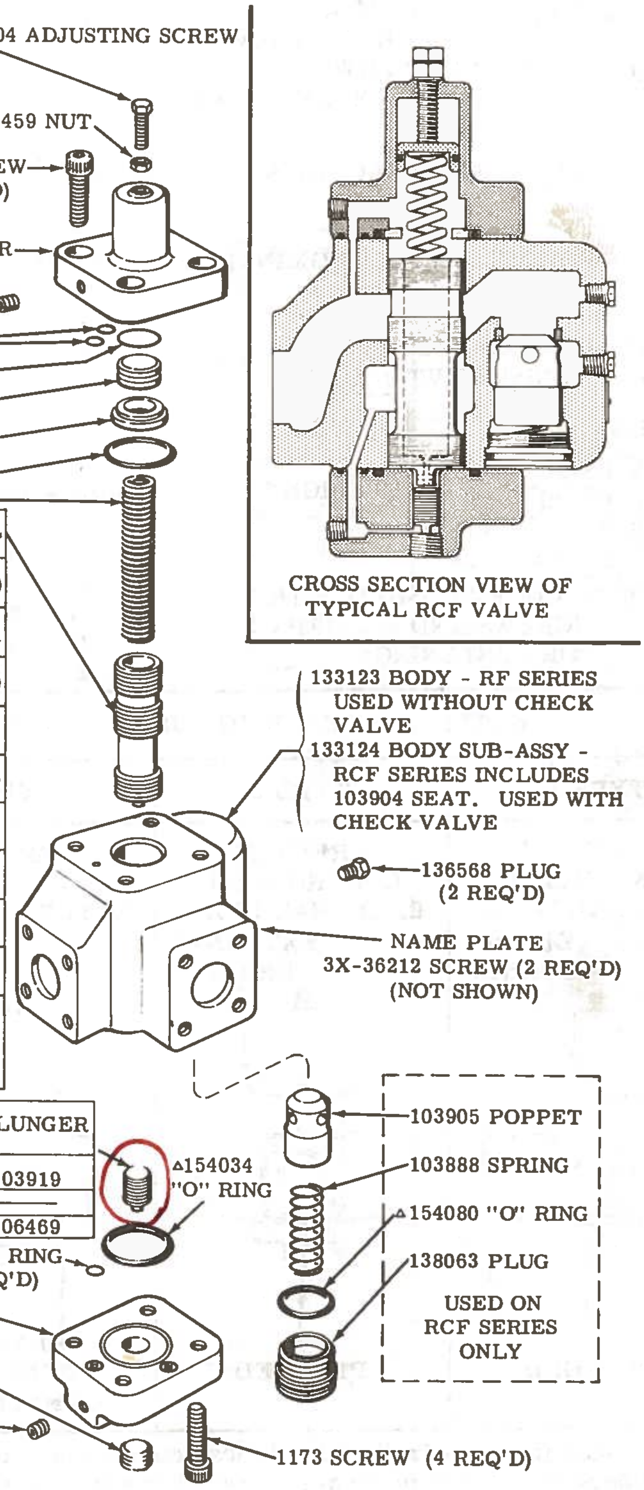


MODEL	PRESS. RANGE	COVER	SPRING	SPOOL
RF-16-A*-10	A (250 PSI)	103918	133105	103920
RCF-16-A*-10				
RF-16-AP*-10		209651		104841
RCF-16-AP*-10				
RF-16-B*-10	B (500 PSI)	103918	133106	103920
RCF-16-B*-10				
RF-16-BP*-10		209651		104841
RCF-16-BP*-10				
RF-16-D*-10	D (1000 PSI)	103918	133107	103920
RCF-16-D*-10				
RF-16-DP*-10		209651		104841
RCF-16-DP*-10				
RF-16-F*-10	F (2000 PSI)	306705		103920
RCF-16-F*-10				
RF-16-FP*-10		312723		104841
RCF-16-FP*-10				
RCF-16-X*-10	X (31 PSI)	103918	133105	104841
RF-16-Z*-10	Z (125 PSI)	103918	133107	104841
RCF-16-Z*-10				
RF-16-ZP*-10		209651		
RCF-16-ZP*-10				

PRESSURE RANGE	PLUNGER
A, B, & D	103919
X or Z	———
F	306469

SEE BACK PAGE FOR CONNECTION FLANGES

△ INCLUDED IN SEAL KIT 919068

MODEL CODE BREAKDOWN

R (C) F-16-*(P)*-10

- R — PRESSURE CONTROL VALVE
- (C) — C - WITH INTEGRAL CHECK VALVE (REVERSE FREE FLOW) (OMITTED - WITHOUT CHECK VALVE)
- F — FLANGE CONNECTIONS
- 16 — VALVE SIZE - 2" NOMINAL
- * — PRESSURE RATING
  - A - 250 PSI
  - B - 500 PSI
  - D - 1000 PSI
  - F - 2000 PSI
  - Z - 125 PSI
- (P) — CONTROL
  - P - AUXILIARY CONTROL (MAY BE USED WITH ANY OF THE 4 VALVE TYPES SHOWN)
  - (OMITTED - STANDARD CONTROL)
- * — VALVE TYPES (INSET VIEWS AT BOTTOM OF PAGE SHOW THE COVER POSITIONS FOR VALVE TYPES 1 THROUGH 4)
- 10 — DESIGN NUMBER

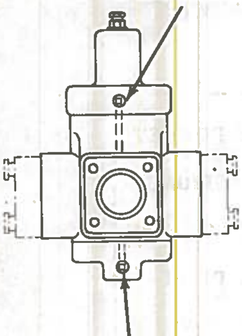
You don't have this

FLANGE CONNECTIONS (NOT FURNISHED WITH UNIT)		
MODEL	PIPE SIZE	TYPE
FL-12-PS-20	1-1/2"	STRAIGHT
FL-16-PS-20	2"	STRAIGHT
FL-12-PL-20	1-1/2"	ELL
FL-16-PL-20	2"	ELL
FLANGES ARE FURNISHED WITH A SEAL, SCREWS AND WASHERS FOR FASTENING		

NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1 — DIRECTLY CONTROLLED INTERNAL DRAIN

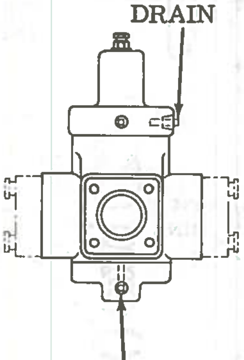
DRAIN PLUGGED



PLUGGED

TYPE 2 — DIRECTLY CONTROLLED EXTERNAL DRAIN

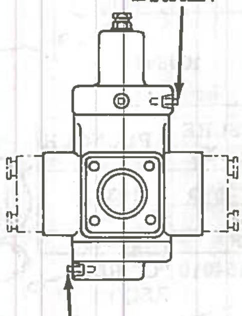
EXTERNAL DRAIN



PLUGGED

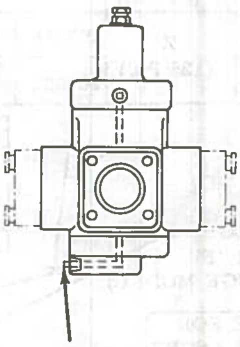
TYPE 3 — REMOTELY CONTROLLED EXTERNAL DRAIN

EXTERNAL DRAIN



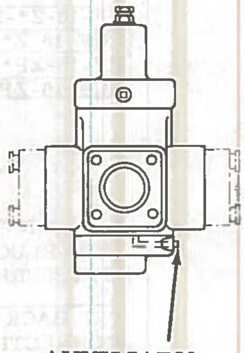
REMOTE CONTROL CONNECTION

TYPE 4 — REMOTELY CONTROLLED INTERNAL DRAIN



REMOTE CONTROL CONNECTION

"P" FEATURE — AUXILIARY CONTROL VALVE TYPE IS OPTIONAL



AUXILIARY CONTROL CONNECTION

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

PRESSURE REDUCING VALVES

(F3)X(C)T-03-* *-21/22

(F3)X(C)G-03-* *-21/22

VICKERS®
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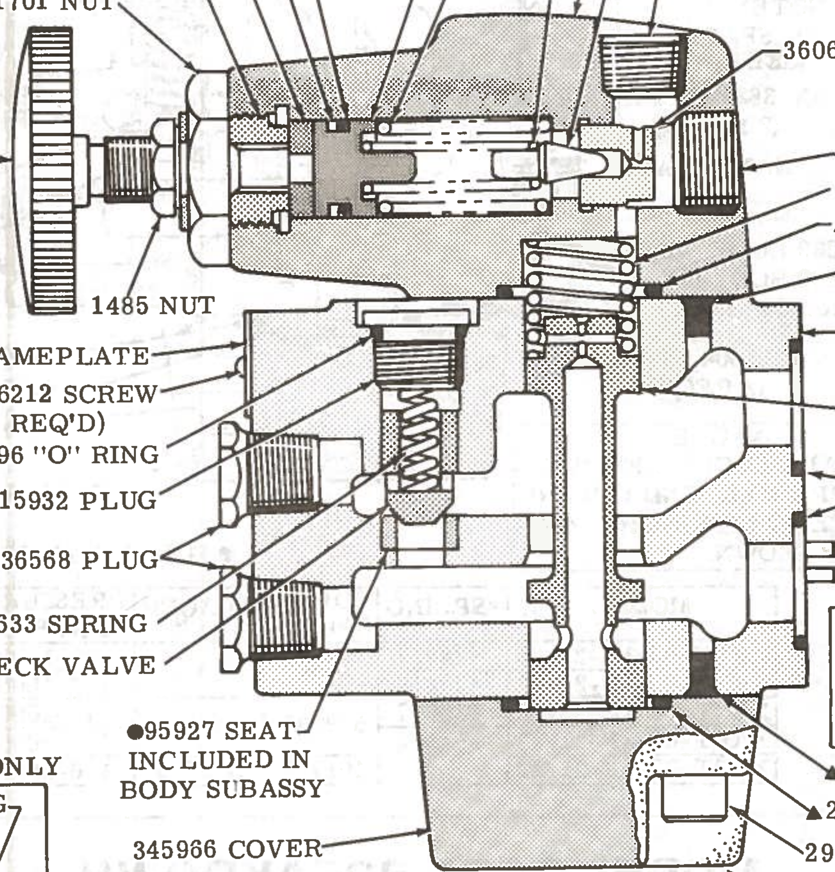
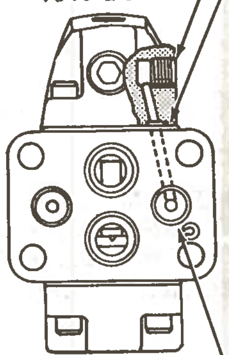


*REPLACE SPRING AND SPOOL ON -21 DESIGN UNITS THEN RESTAMP NAMEPLATE TO -22 DESIGN.

●XCG MODELS ONLY



⊖NOTE
INSTALL LOCKSCREW WITH STEPPED O.D. END TOWARD SPACER OR SPRING RETAINER AS SHOWN.

▲INCLUDED IN F3 SEAL KIT 919836

MODEL	*SPRING	COVER SPRING	SPACER	PRESSURE RANGE PSI	RATED FLOW USGPM
X(C)G-03-1B-21/22	428817	2280		75-1000	7
X(C)G-03-1F-21/22	428818		—	150-1000	14
X(C)G-03-2B-21/22	428817	583937		75-2000	7
X(C)G-03-2F-21/22	428818			150-2000	14
X(C)G-03-3F-21/22		401700	386715	150-2850	

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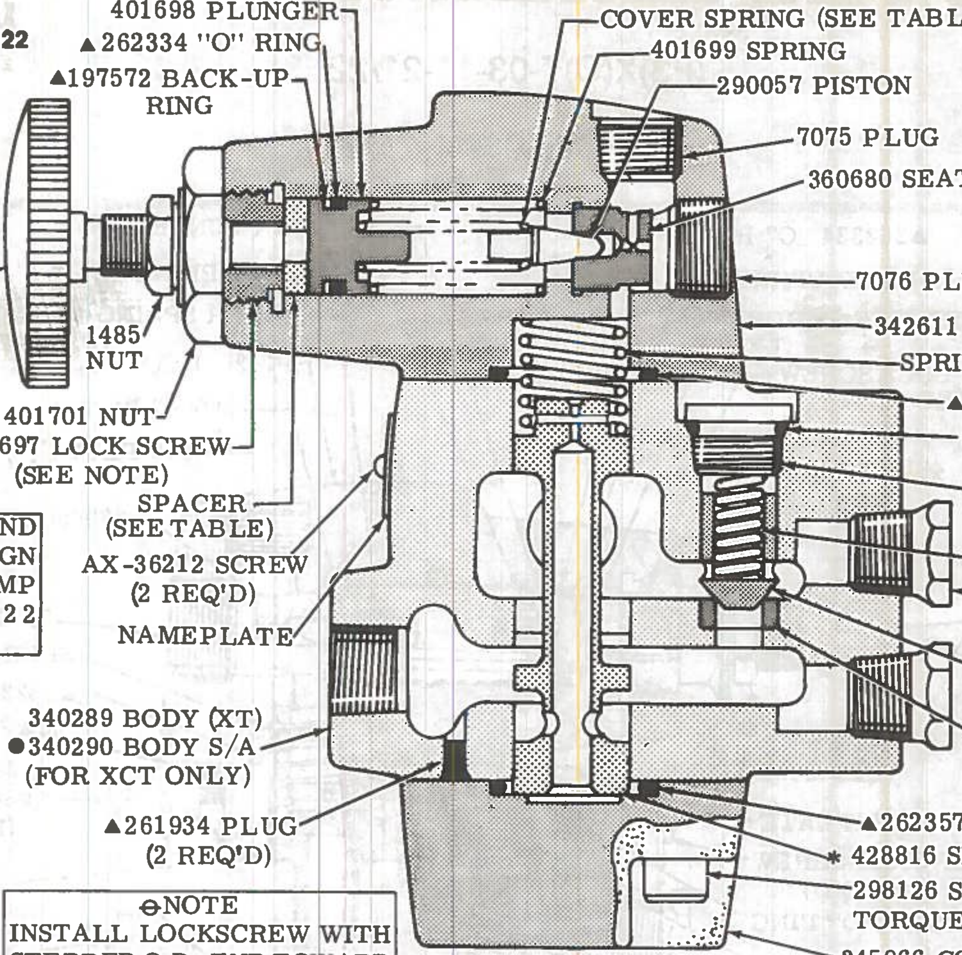
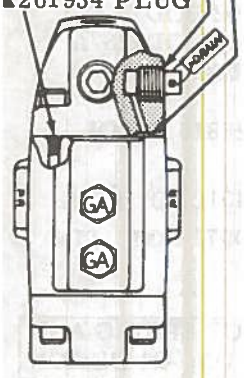
(F3) - X(C)T - 03 - ** - 21/22



REPLACE SPRING AND SPOOL ON -21 DESIGN UNITS THEN RESTAMP NAMEPLATE TO -22 DESIGN.



⊖NOTE
INSTALL LOCKSCREW WITH STEPPED O.D. END TOWARD SPACER OR SPRING RETAINER AS SHOWN.

● FOR XCT MODELS ONLY

▲INCLUDED IN F3 SEAL KIT 919836

MODEL	*SPRING	COVER SPRING	SPACER	PRESSURE RANGE PSI	RATED FLOW USGPM
X(C)T-03-1B-21/22	428817	2280	———	75-1000	7
X(C)T-03-1F-21/22	428818			150-1000	14
X(C)T-03-2B-21/22	428817	583937		75-2000	7
X(C)T-03-2F-21/22	428818			150-2000	14
X(C)T-03-3F-21/22		401700	386715	150-2850	

MODEL CODE BREAKDOWN

(F3) - X (C) * - 03 - ** - 2*

- (F3) — SEALS FOR MINERAL OIL & FIRE RESISTANT FLUIDS
- X — PRESSURE REDUCING
- (C) — CHECK VALVE
- * — MOUNTING: G - MANIFOLD OR SUBPLATE; T - 3/8 IN. NPTF THREAD
- 03 — 3/8 IN. VALVE SIZE
- * — MAXIMUM PRESSURE ADJUSTMENT: 1 - 1000 PSI; 2 - 2000 PSI; 3 - 2850 PSI (150 PSI MINIMUM RECOMMENDED)
- * — MAXIMUM RATED USGPM FLOW CAPACITY: B - 7 USGPM 75 MIN. ADJ. PRESS.; F - 14 USGPM 150 MIN. ADJ. PRESS.
- 2* — -21/-22 DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

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MODULAR SEQUENCE VALVES

DGC-06-*(*)-50

DGC-01-*(*)-50

MODEL CODE BREAKDOWN

"10" SERIES

DGC-01- * (*)- 50

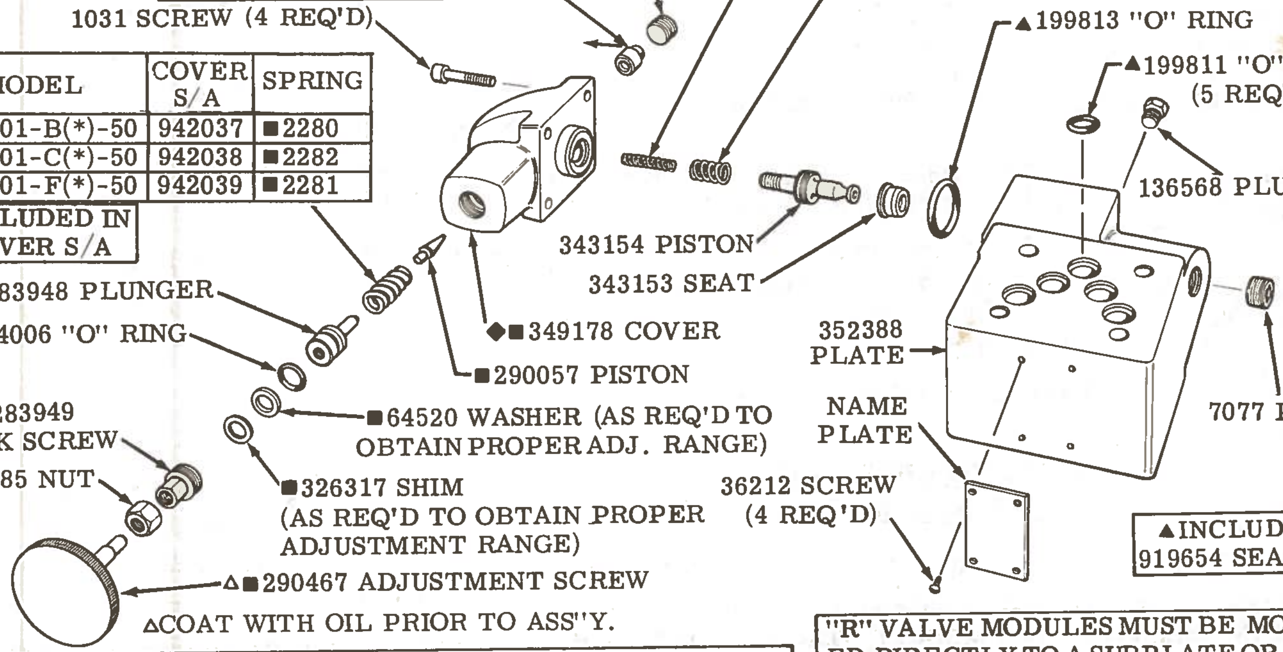
- DIRECTIONAL CONTROL
- GASKET MOUNTED
- RELIEF MODULE
- 1/8 INCH SIZE
- PRESSURE RANGE
  - "B" 125-1000 PSI
  - "C" 500-2000 PSI
  - "F" 1500-3000 PSI
- "V" HIGH VENTING (OMIT WHEN NOT NEEDED)
- DESIGN NUMBER

◆NOT AVAILABLE FOR SALE AS INDIVIDUAL PART

■285601 SEAT
NOTE: FACE CROSSHOLE AS INDICATED BY ARROW

MODEL	COVER S/A	SPRING
DGC-01-B(*)-50	942037	■2280
DGC-01-C(*)-50	942038	■2282
DGC-01-F(*)-50	942039	■2281

■INCLUDED IN COVER S/A



▲INCLUDED IN 919654 SEAL KIT

△COAT WITH OIL PRIOR TO ASS'Y.

REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 112 IN. LBS.

THE FOLLOWING SUBPLATES MAY BE USED TO MOUNT A 10 SERIES DIRECTIONAL VALVE AND ONE OR MORE MODULAR VALVES:

DGSM-01X-10	(3/8 INCH NPT)	ASSY. NO. 234488
DGSM-01Y-10	(1/2 INCH NPT)	ASSY. NO. 221212
DGRXM-01X-50	(3/8 INCH NPT)	ASSY. NO. 347454
DGRXM-01Y-50	(1/2 INCH NPT)	ASSY. NO. 347455

(DGRXM SUBPLATES HAVE THE "Y" PORT)

"R" VALVE MODULES MUST BE MOUNTED DIRECTLY TO A SUBPLATE OR MANIFOLD FOR DRAIN THRU THE "Y" PORT. "X" VALVE MODULES MUST BE DRAINED THRU THE COVER (TYPE "E") OR PORT "B" (TYPE "L") WHEN NOT MOUNTED DIRECTLY TO A SUBPLATE OR MANIFOLD WITH A "Y" DRAIN CONNECTION.

CAUTION
THIS MODULE CANNOT BE USED WITH PRESSURE CENTERED OR DG18 AIR OPERATED VALVES.

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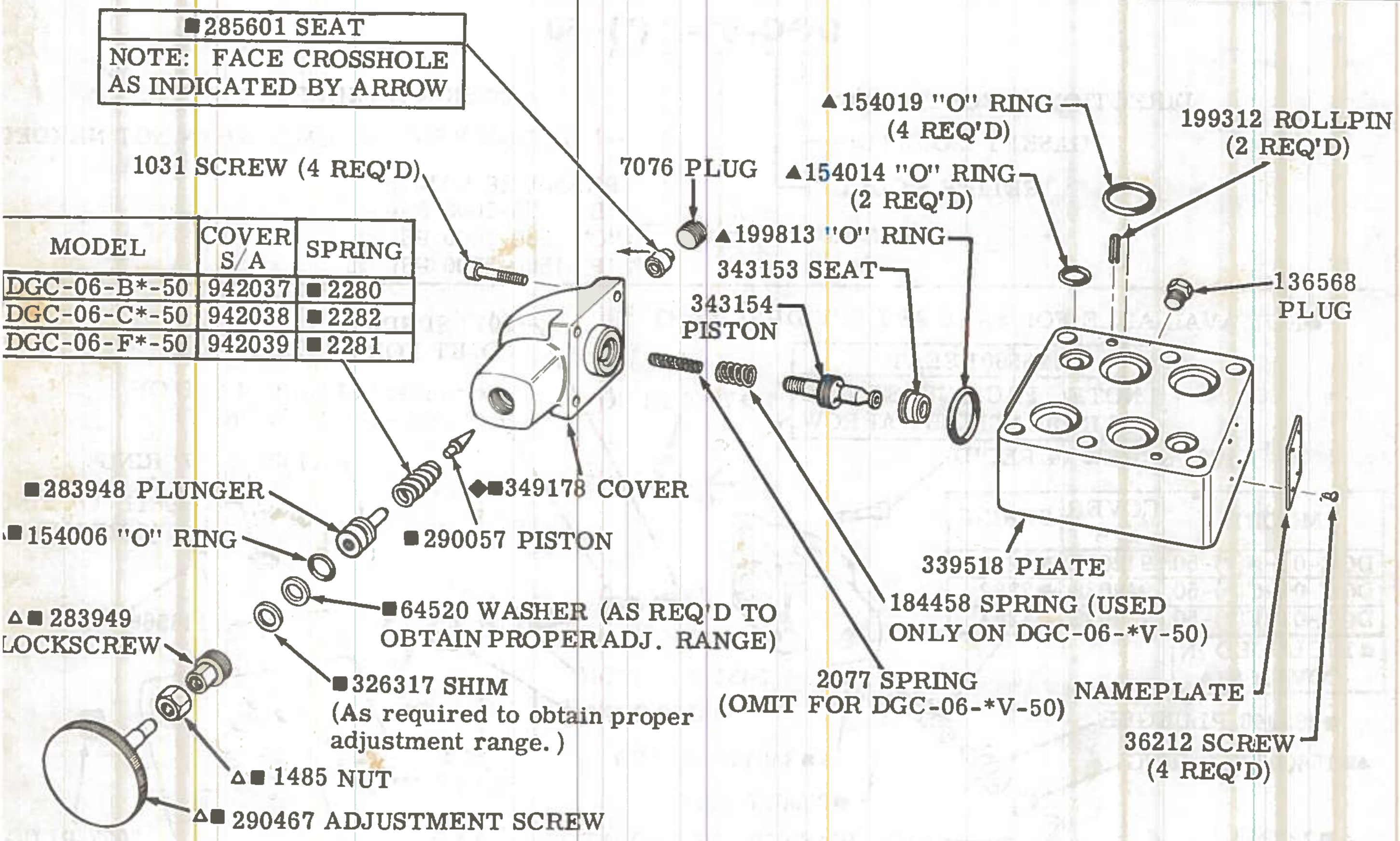
Revised 11-1-85

MODEL CODE BREAKDOWN

DGC-06- * (*)- 50

- DIRECTIONAL CONTROL
- GASKET MOUNTED
- RELIEF MODULE
- 3/4 INCH SIZE
- PRESSURE RANGE
  - "B" 125-1000 PSI
  - "C" 500-2000 PSI
  - "F" 1500-3000 PSI
- "V" HIGH VENTING (OMIT WHEN NOT NEEDED)
- DESIGN NUMBER

MODEL	COVER S/A	SPRING
DGC-06-B*-50	942037	■ 2280
DGC-06-C*-50	942038	■ 2282
DGC-06-F*-50	942039	■ 2281



ΔCOAT WITH OIL PRIOR TO ASSEMBLY

◆NOT AVAILABLE FOR SALE AS INDIVIDUAL PART

NOTE
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 700 IN. LBS.

CAUTION
THIS MODULE CANNOT BE USED WITH PRESSURE CENTERED OR DG18 AIR OPERATED VALVES.

NOTE
THE FOLLOWING SUBPLATES MAY BE USED TO MOUNT A 50 SERIES DIRECTIONAL VALVE AND ONE OR MORE MODULAR VALVES:

DGSM-06-50	(3/4 INCH NPT)	ASSY. NO. 280497
DGSM-06X-50	(1 INCH NPT)	ASSY. NO. 280498
DGSM-06Y-50	(1-1/4 INCH NPT)	ASSY. NO. 315213

■INCLUDED IN COVER S/A

▲INCLUDED IN 919655 SEAL KIT

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Service Parts Information

MODULAR FLOW REGULATOR VALVES

DGFN-06-50

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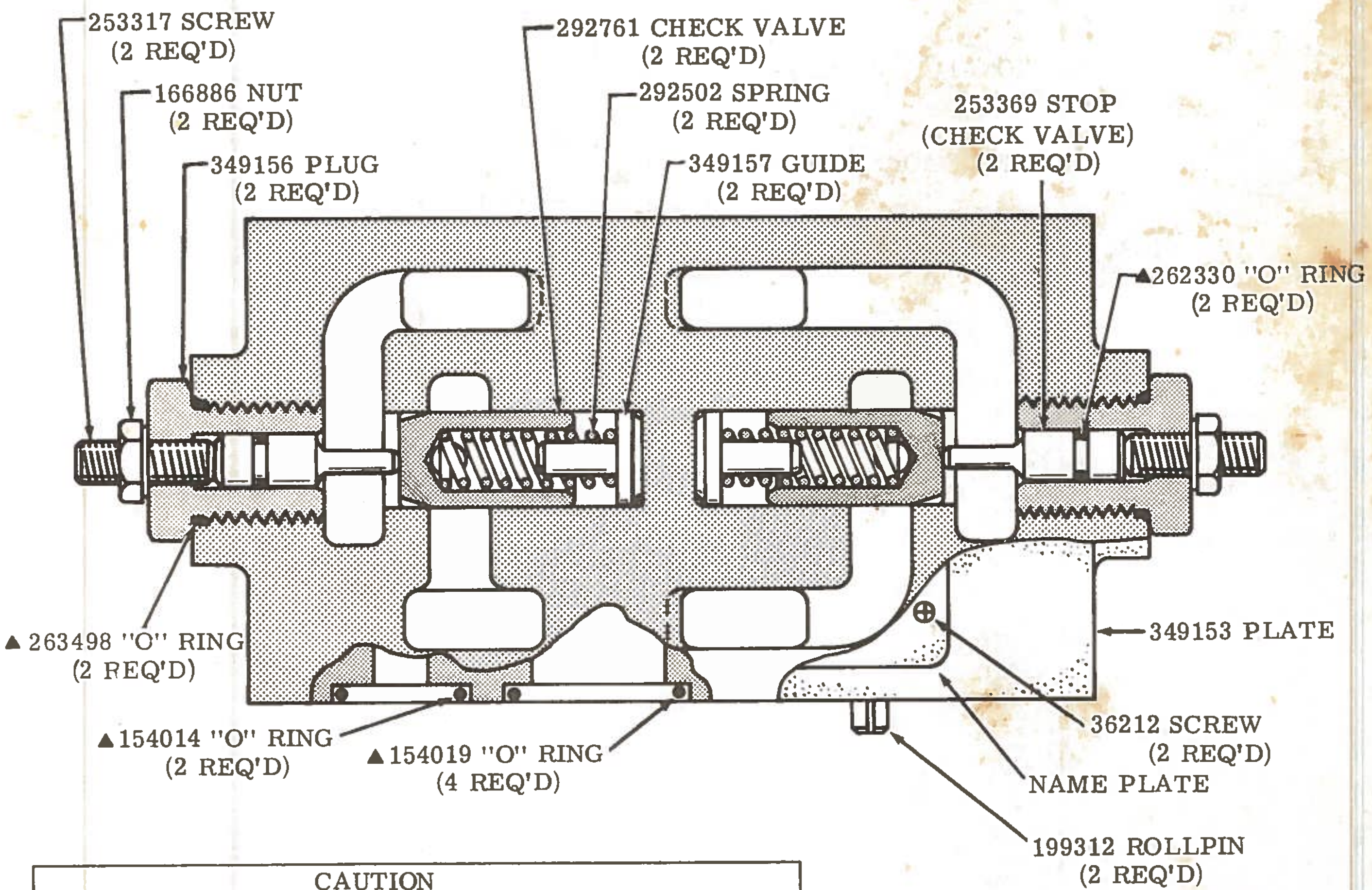

CAUTION
THIS VALVE CANNOT BE USED WITH PRESSURE CENTERED OR DG-18 AIR OPERATED VALVES.

NOTE
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 700 IN. LBS.

NOTE
THE FOLLOWING SUBPLATES MAY BE USED TO MOUNT A 60 SERIES DIRECTIONAL VALVE AND ONE OR MORE MODULAR VALVES:

DGSM-06-50	(3/4 INCH NPT)	ASSY. NO. 280497
DGSM-06X-50	(1 INCH NPT)	ASSY. NO. 280498
DGSM-06Y-50	(1-1/4 INCH NPT)	ASSY. NO. 315213

▲ INCLUDED IN 919646 SEAL KIT

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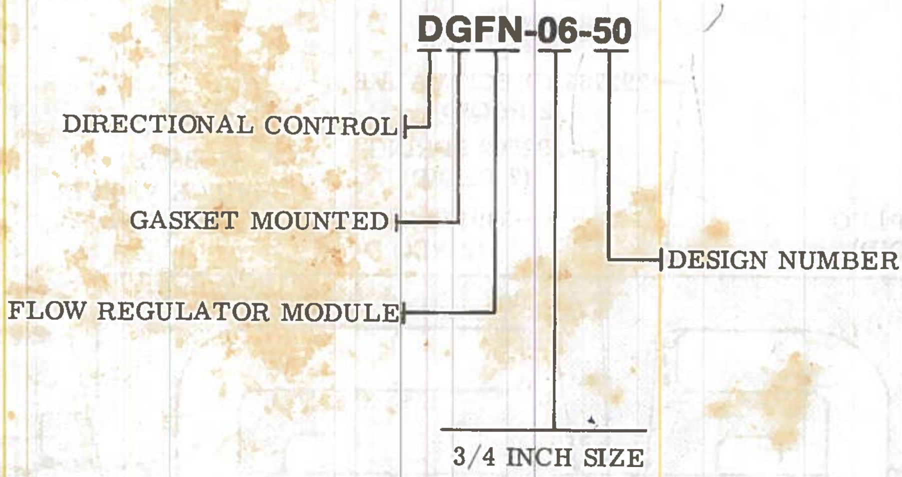
Revised 11-1-85

MODEL CODE BREAKDOWN



Litho in U.S.A.

Service Parts Information

UNLOADING RELIEF VALVES WITH INTEGRAL CHECKS

URG*–06–*–1*
URG*–10–*–1*

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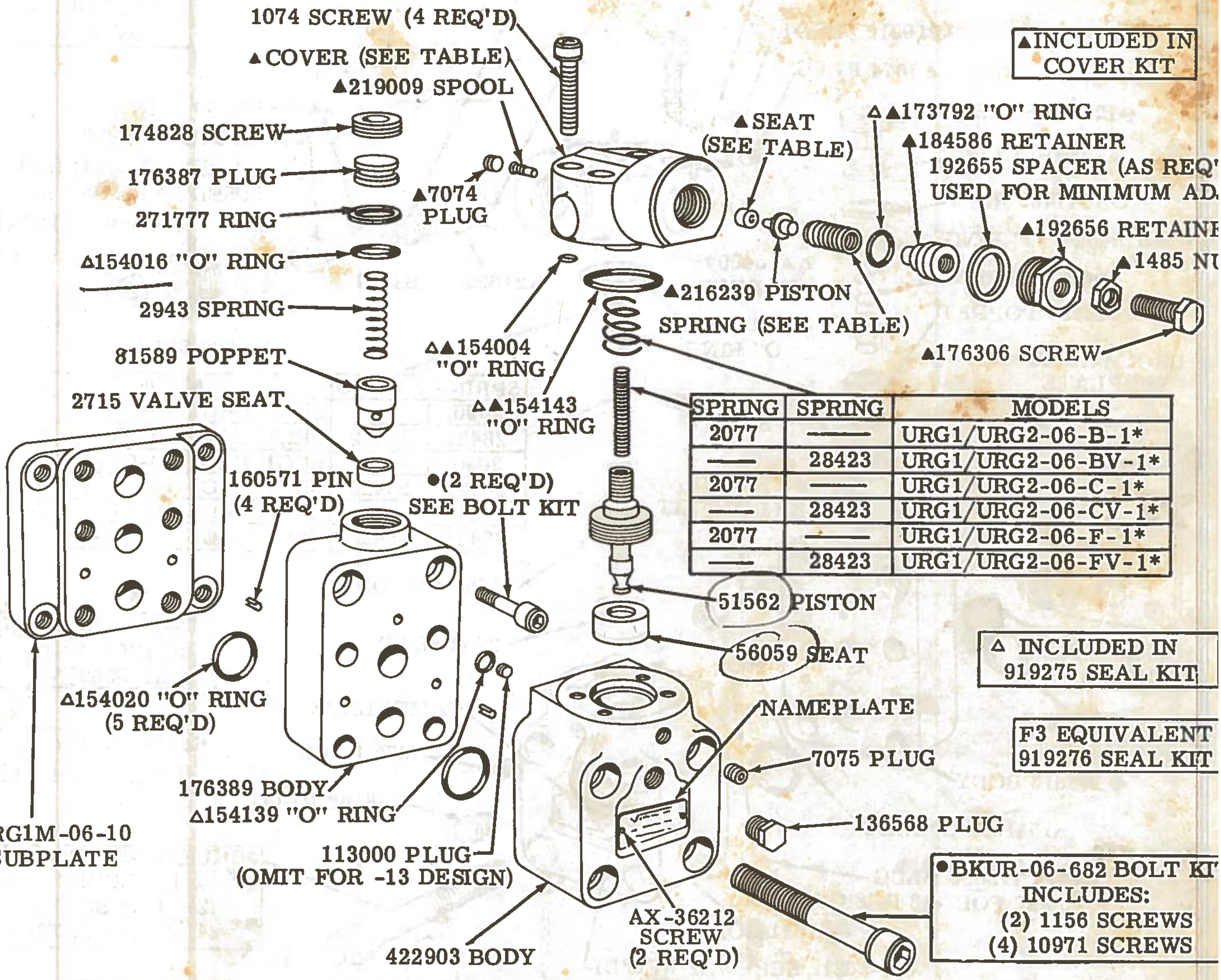
MODEL	COVER KIT	▲ COVER	▲ SEAT	▲ SPRING
URG1-06-B-10/11	941924	176388		175071
URG1-06-B-12/13	938626	258330		
URG1-06-C-10/11	941925	176388		175072
URG1-06-C-12/13	938627	258330		
URG1-06-F-10/11	941926	176388	213946	175073
URG1-06-F-12/13	938628	258330		
URG2-06-B-12/13	941924	176388		175071
URG2-06-C-12/13	941925	176388		175072
URG2-06-F-12/13	941926	176388		175073

CAUTION
The URG1-**-*-10/11 and the URG2-**-*-12/13 are internally drained valves. URG1-**-*-12/13 series are externally drained valves and must be provided with a separate drain line from the cover to the reservoir.



▲INCLUDED IN COVER KIT

SPRING	SPRING	MODELS
2077	——	URG1/URG2-06-B-1*
——	28423	URG1/URG2-06-BV-1*
2077	——	URG1/URG2-06-C-1*
——	28423	URG1/URG2-06-CV-1*
2077	——	URG1/URG2-06-F-1*
——	28423	URG1/URG2-06-FV-1*

△ INCLUDED IN 919275 SEAL KIT

F3 EQUIVALENT 919276 SEAL KIT

●BKUR-06-682 BOLT KI
INCLUDES:
(2) 1156 SCREWS
(4) 10971 SCREWS

CAUTION

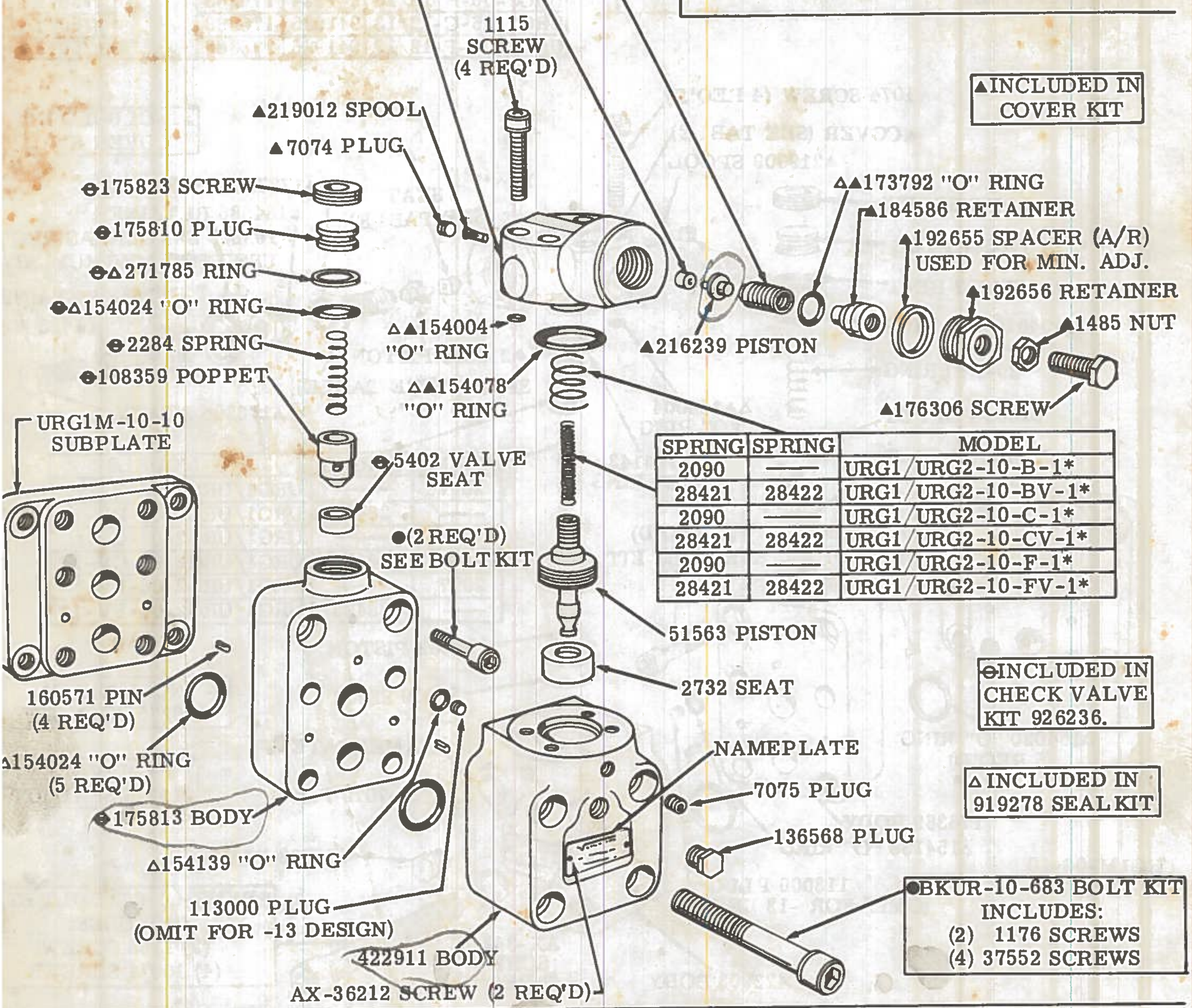
The URG1-**-*-10/11 and the UGR2-**-*-12/13 are internally drained valves. URG1-**-*-12/13 series are externally drained valves and must be provided with a separate drain line from the cover to the reservoir.

MODEL	COVER KIT	▲ COVER	▲ SEAT	▲ SPRING
URG1-10-B-10/11	941927	175811	213946	175071
URG1-10-B-12/13	938629	258339		
URG1-10-C-10/11	941928	175811		175072
URG1-10-C-12/13	938630	258339		
URG1-10-F-10/11	941929	175811		175073
URG1-10-F-12/13	938631	258339		
URG2-10-B-12/13	941927	175811		175071
URG2-10-C-12/13	941928	175811		175072
URG2-10-F-12/13	941929	175811		175073

MODEL CODE BREAKDOWN

URG 1-10-B V-12/13

- UNLOADING RELIEF VALVE
- GASKET MOUNTED
- DRAIN: 1 - EXT., 2 - INT.
- CONNECTIONS NOMINAL PIPE THD.: 06-3/4 NPT, 10-1 1/4 NPT
- PRESSURE RANGE: B - 350-1000 PSI; C - 500-2000 PSI; F - 1500-3000 PSI
- HIGH VENT SPRING OMITTED STANDARD SPRING
- DESIGN -10/-11, -12/-13



SPRING	SPRING	MODEL
2090	——	URG1/URG2-10-B-1*
28421	28422	URG1/URG2-10-BV-1*
2090	——	URG1/URG2-10-C-1*
28421	28422	URG1/URG2-10-CV-1*
2090	——	URG1/URG2-10-F-1*
28421	28422	URG1/URG2-10-FV-1*

▲INCLUDED IN COVER KIT

⊖INCLUDED IN CHECK VALVE KIT 926236.

△INCLUDED IN 919278 SEAL KIT

●BKUR-10-683 BOLT KIT INCLUDES:
(2) 1176 SCREWS
(4) 37552 SCREWS

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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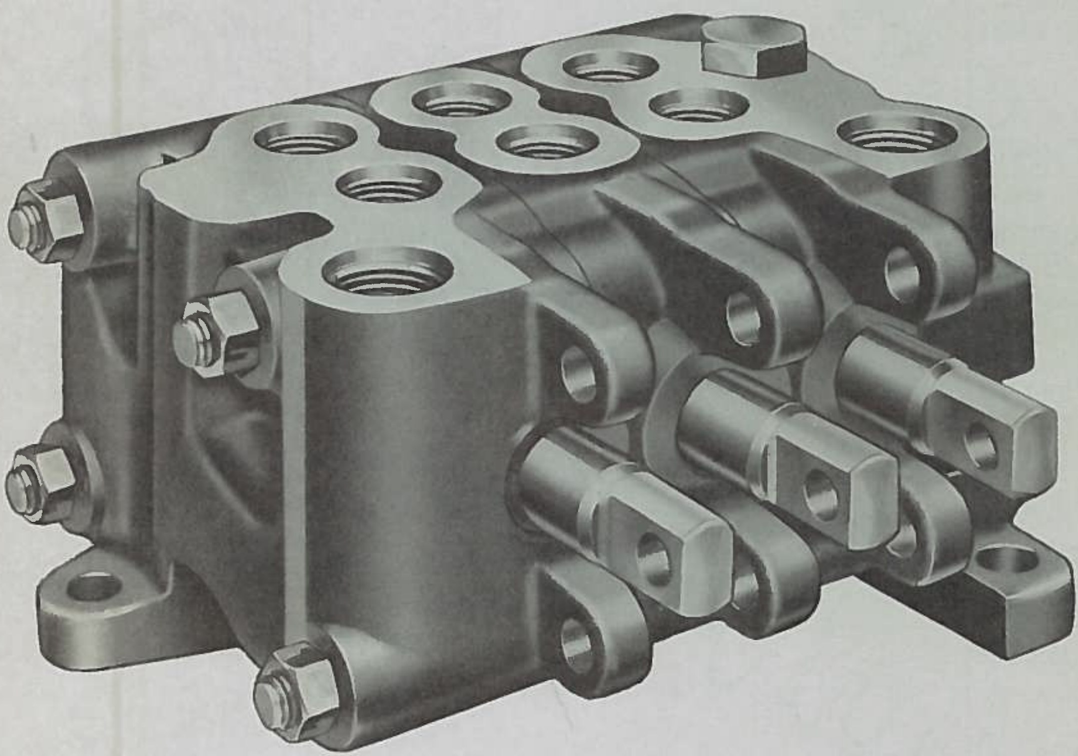
Service Parts Information

Multiple Unit Valves

CM11 Series -21 Design



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Revised 10-1-87

M-1729-S

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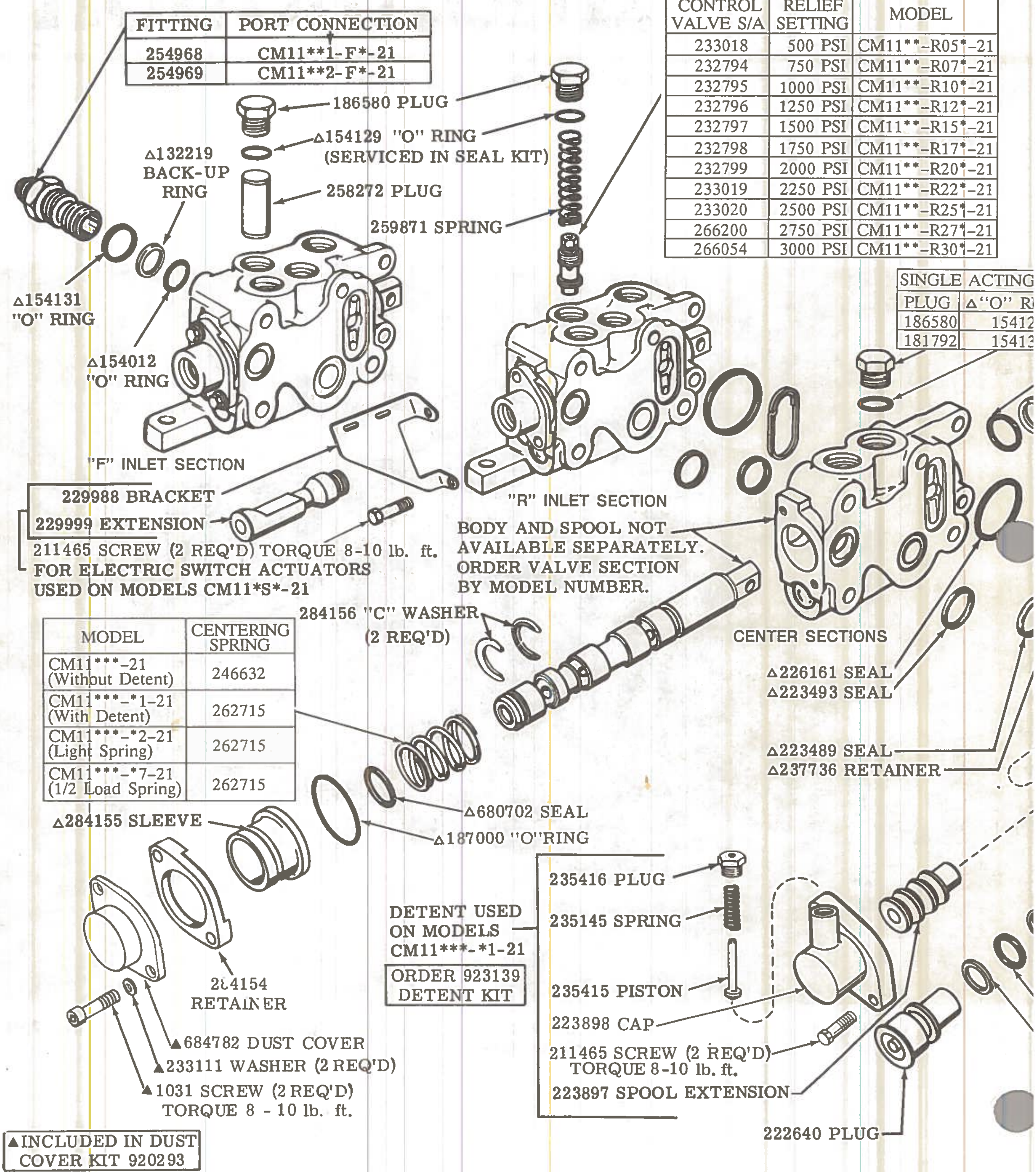


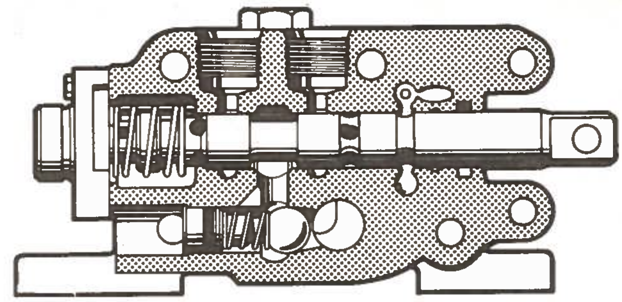
FITTING	PORT CONNECTION
254968	CM11**1-F*-21
254969	CM11**2-F*-21

CONTROL VALVE S/A	RELIEF SETTING	MODEL
233018	500 PSI	CM11**-R05*-21
232794	750 PSI	CM11**-R07*-21
232795	1000 PSI	CM11**-R10*-21
232796	1250 PSI	CM11**-R12*-21
232797	1500 PSI	CM11**-R15*-21
232798	1750 PSI	CM11**-R17*-21
232799	2000 PSI	CM11**-R20*-21
233019	2250 PSI	CM11**-R22*-21
233020	2500 PSI	CM11**-R25*-21
266200	2750 PSI	CM11**-R27*-21
266054	3000 PSI	CM11**-R30*-21

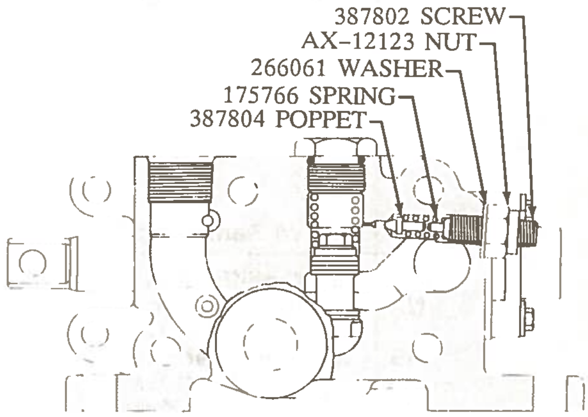
SINGLE ACTING	
PLUG	△"O" R
186580	15412
181792	15413

MODEL	CENTERING SPRING
CM11***-21 (Without Detent)	246632
CM11***-*1-21 (With Detent)	262715
CM11***-*2-21 (Light Spring)	262715
CM11***-*7-21 (1/2 Load Spring)	262715

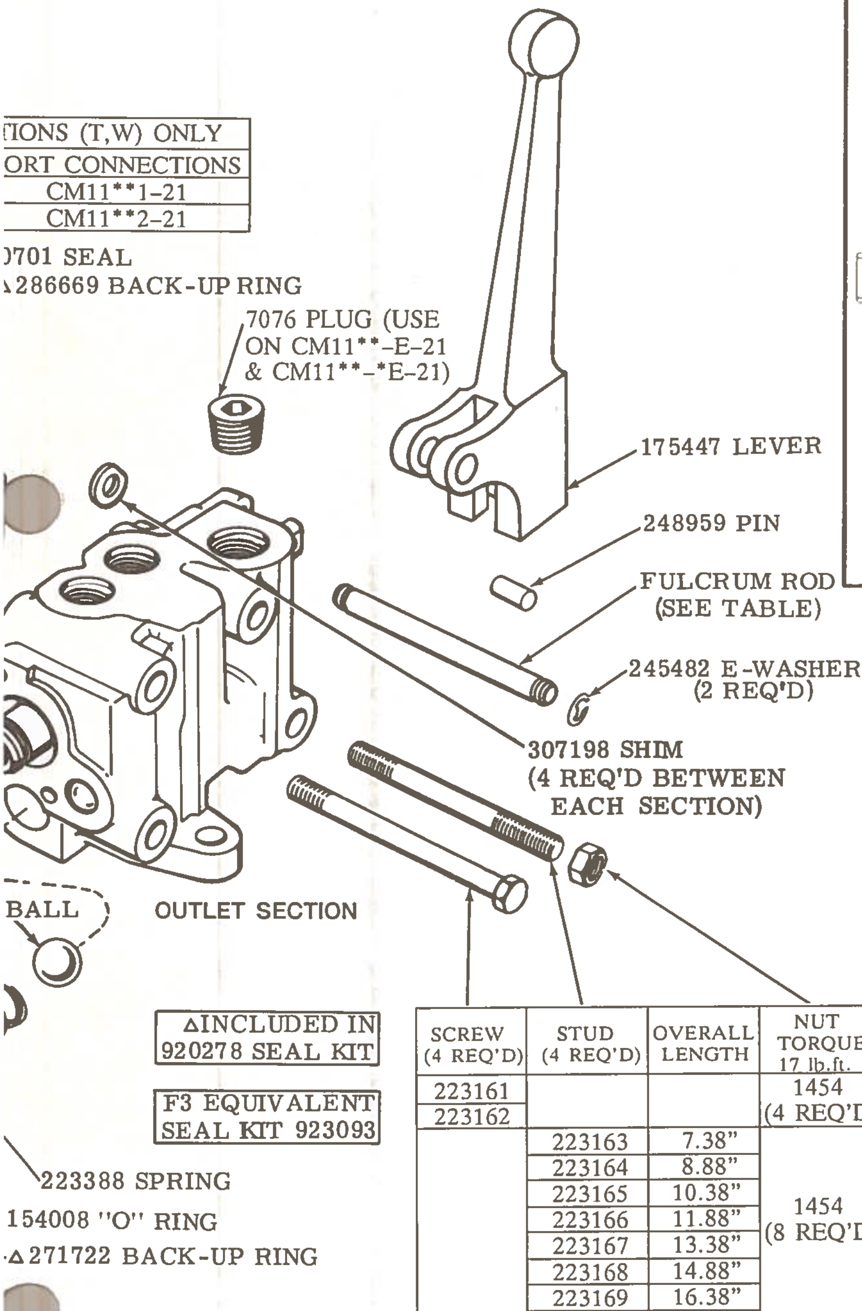
FULCRUM ROD	OVERALL LENGTH	MODEL	OPERATING SECTIONS
245491	1.766"	CM11-H1-20	1
245492	3.391"	CM11-H2-20	2
245493	4.891"	CM11-H3-20	3
245494	6.391"	CM11-H4-20	4
245495	7.891"	CM11-H5-20	5
245496	9.391"	CM11-H6-20	6
245497	10.891"	CM11-H7-20	7
245498	12.391"	CM11-H8-20	8
245499	13.891"	CM11-H9-20	9
245500	15.391"	CM11-H10-20	10

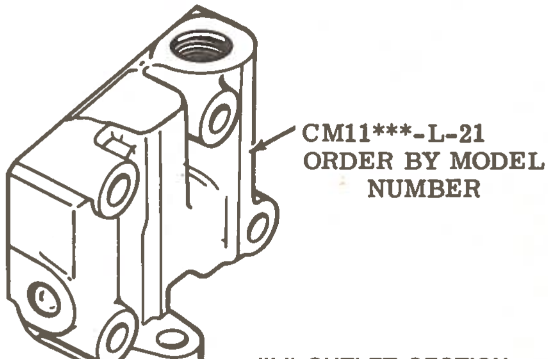


CM11NO*-R**V** Option



NOTE
Adjust 387802 screw to specified relief setting (V**) and tighten AX-12123 jam nut. (V**) value must be 250 PSI below (R**) value.





"L" OUTLET SECTION

∆INCLUDED IN 920278 SEAL KIT

F3 EQUIVALENT SEAL KIT 923093

SCREW (4 REQ'D)	STUD (4 REQ'D)	OVERALL LENGTH	NUT TORQUE 17 lb.ft.	MODEL	OPERATING SECTIONS
223161			1454 (4 REQ'D)	CM11-P1-20	1
223162				CM11-P2-20	2
	223163	7.38"	1454 (8 REQ'D)	CM11-P3-20	3
	223164	8.88"		CM11-P4-20	4
	223165	10.38"		CM11-P5-20	5
	223166	11.88"		CM11-P6-20	6
	223167	13.38"		CM11-P7-20	7
	223168	14.88"		CM11-P8-20	8
	223169	16.38"		CM11-P9-20	9
	223170	17.88"		CM11-P10-20	10

MODEL CODE BREAKDOWN

CM 11 ** * – * ** V *** * **–21**

1 2 3 4 5 6 7 8 9 10 11

1 — Multiple Unit Control Valve

2 — Series

3 — Valve Bank Modification

NO – No Modification
ND – Standard Sections – Dust Covers
NS – Standard Sections – Electrical Switch Actuators
ZO – Narrow Bypass Sections – No Modification
ZD – Narrow Bypass Sections – Dust Covers
ZS – Narrow Bypass Sections – Electrical Switch Actuators

4 — Port Connections

1 – 7/8–14 UNF – 2B Inlet & Discharge Ports – 3/4–16 UNF – 2B Cylinder Ports
2 – 1 1/16–14 UNF – 2B Inlet & Discharge Ports – 7/8–14 UNF – 2B Cylinder Ports

5 — Inlet Body Type

F – Carryover Port – No Relief Valve
R – Standard – Relief Valve (Partial Flow Bypass)
K – Standard – Relief Valve (Full Flow Bypass)
J – Standard – Relief Valve (Partial Flow Bypass)

6 — System Relief Valve Setting – PSI

05 – 500 PSI
07 – 750 PSI
10 – 1000 PSI
12 – 1250 PSI
15 – 1500 PSI
17 – 1750 PSI
20 – 2000 PSI
22 – 2250 PSI
25 – 2500 PSI
27 – 2750 PSI
30 – 3000 PSI

7 — Adjustable System Relief Valve Setting – PSI (Omit if not required)

V05 – 500 PSI
V07 – 750 PSI
V10 – 1000 PSI
V12 – 1250 PSI
V15 – 1500 PSI
V17 – 1750 PSI
V20 – 2000 PSI
V22 – 2250 PSI
V25 – 2500 PSI

8 — Spool Type

A6 – Counterbalance
B – Motor
C – Float
D – Double Acting
D3 – Dual Function
D4 – Special Metering
D5 – Combined & B Spool Functions
T – Single Acting
W3 – Safety Interlock

9 — Spool Modification (Omit if not required)

1 – Detent For Any Spool
2 – Light Centering Spring
7 – Half Load Centering Spring

10 — Outlet Body Type

L – Standard
E – Carryover Port
E1 – E Section with Additional Outlet Port

11 — Design

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

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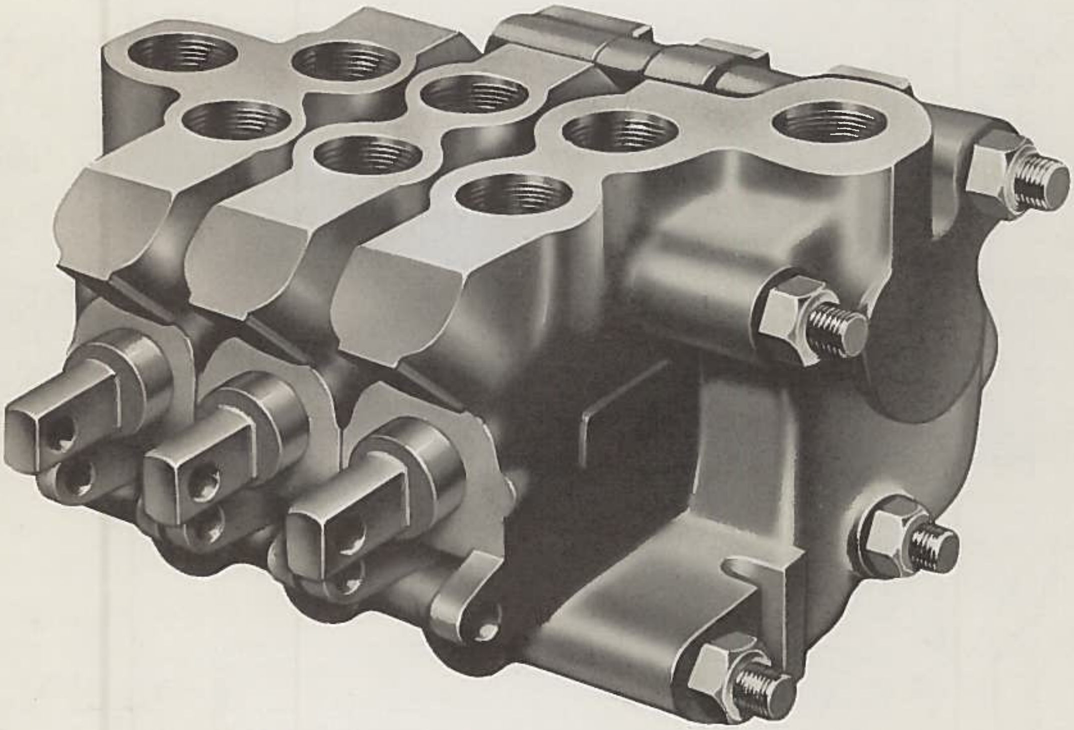
Service Parts Information

Multiple Unit Valves

CM2 Series -30 Design



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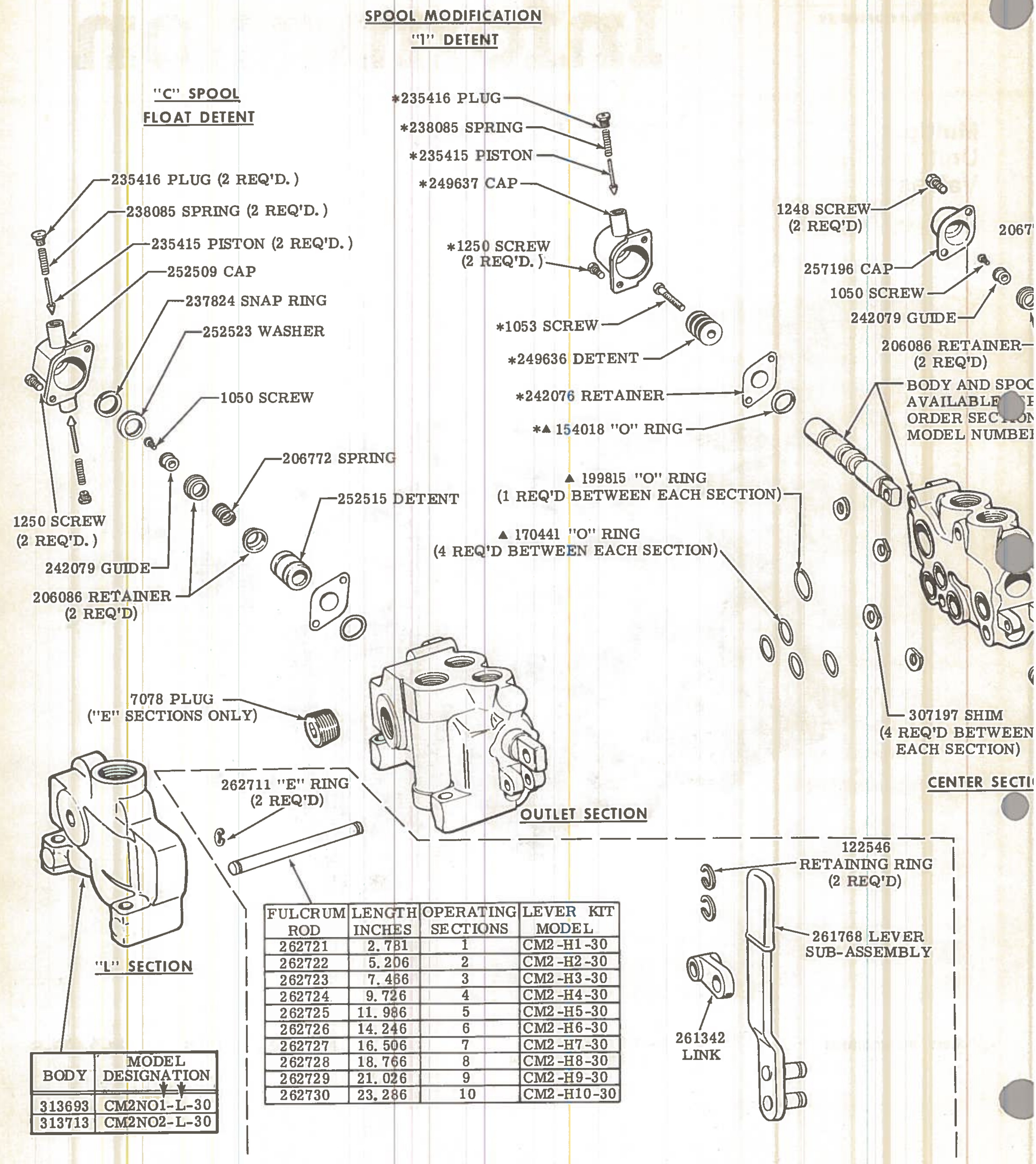
Revised 1-1-88 **M-2403-S**

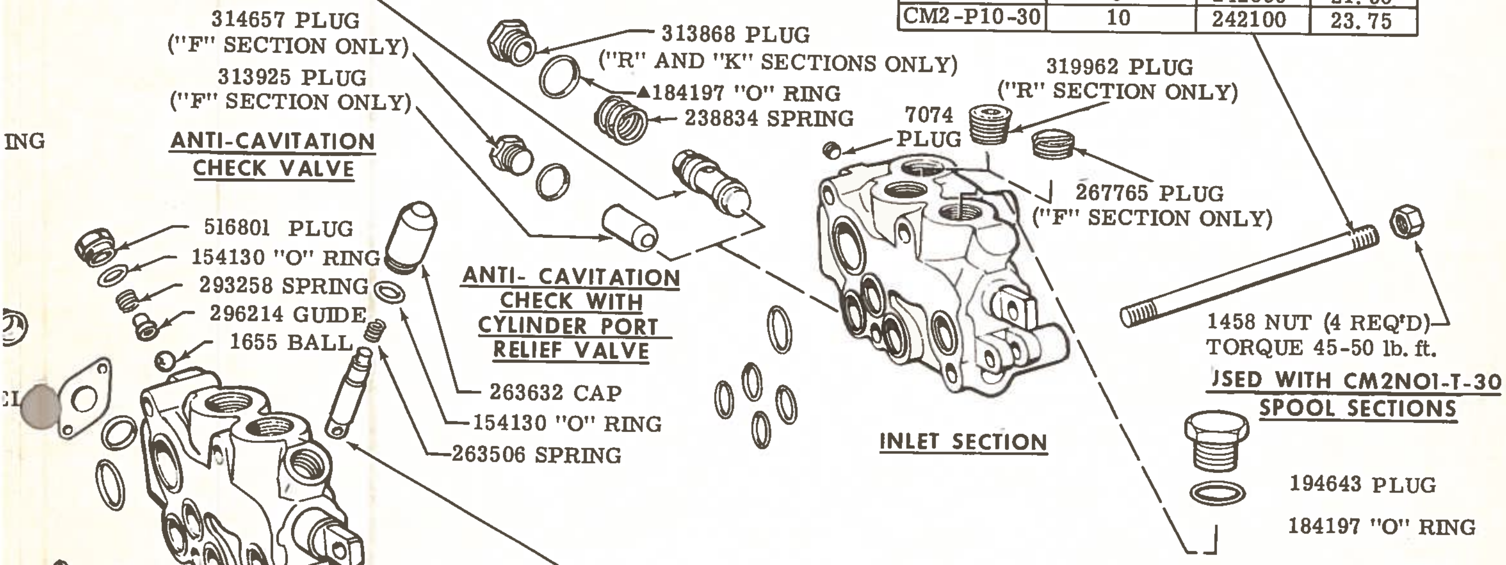


FULCRUM ROD	LENGTH INCHES	OPERATING SECTIONS	LEVER KIT MODEL
262721	2.781	1	CM2-H1-30
262722	5.206	2	CM2-H2-30
262723	7.466	3	CM2-H3-30
262724	9.726	4	CM2-H4-30
262725	11.986	5	CM2-H5-30
262726	14.246	6	CM2-H6-30
262727	16.506	7	CM2-H7-30
262728	18.766	8	CM2-H8-30
262729	21.026	9	CM2-H9-30
262730	23.286	10	CM2-H10-30

BODY	MODEL DESIGNATION
313693	CM2NO1-L-30
313713	CM2NO2-L-30

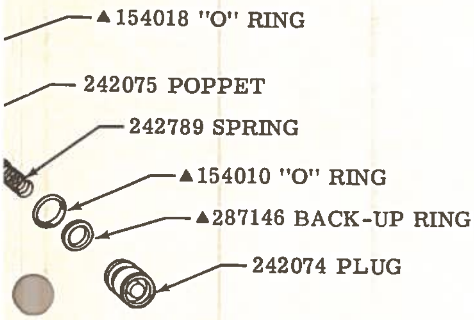
CONTROL VALVE SUB-ASSY	RELIEF SETTING (PSI)	MODEL DESIGNATION
319693	500	CM2NO*-*05*-30
319694	750	CM2NO*-*07*-30
319695	1000	CM2NO*-*10*-30
319696	1250	CM2NO*-*12*-30
319697	1500	CM2NO*-*15*-30
319698	1750	CM2NO*-*17*-30
319699	2000	CM2NO*-*20*-30
319700	2250	CM2NO*-*22*-30
319701	2500	CM2NO*-*25*-30

STUD KIT MODEL	OPERATING SECTIONS	■STUD (4 REQ'D)	LENGTH INCHES
CM2-P1-30	1	280786	5.25
CM2-P2-30	2	242092	5.75
CM2-P3-30	3	242093	8.00
CM2-P4-30	4	242094	10.25
CM2-P5-30	5	242095	12.50
CM2-P6-30	6	242096	14.75
CM2-P7-30	7	242097	17.00
CM2-P8-30	8	242098	19.25
CM2-P9-30	9	242099	21.50
CM2-P10-30	10	242100	23.75



PORT RELIEF VALVE SUB-ASSY	RELIEF SETTING (PSI)	MODEL DESIGNATION
263601	750	CM2NO*-*-30-*07
263602	1000	CM2NO*-*-30-*10
263603	1250	CM2NO*-*-30-*12
263604	1500	CM2NO*-*-30-*15
263605	1750	CM2NO*-*-30-*17
263606	2000	CM2NO*-*-30-*20
263607	2250	CM2NO*-*-30-*22
263608	2500	CM2NO*-*-30-*25
294688	2750	CM2NO*-*-30-*27
263610	3000	CM2NO*-*-30-*30
263611	3250	CM2NO*-*-30-*32
263612	3500	CM2NO*-*-30-*35

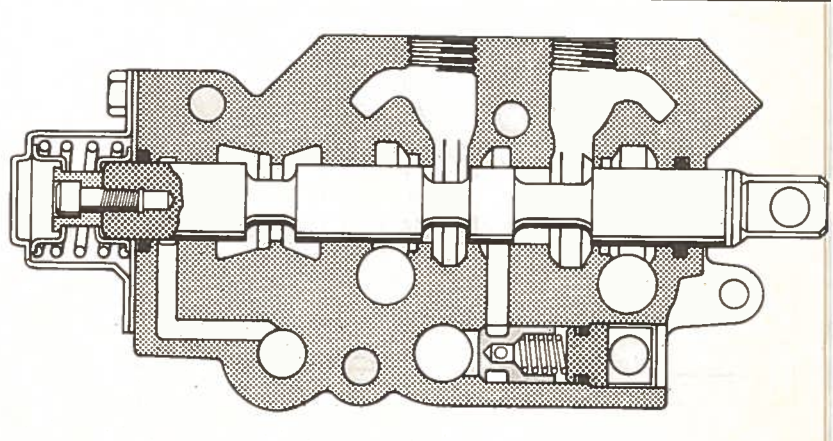
■ CAUTION
THREAD STUDS FULLY INTO OUTLET SECTION BEFORE ASSEMBLING VALVE.



▲INCLUDED IN 922926 SEAL KIT

F3 EQUIVALENT SEAL KIT 920124

*INCLUDED IN 923583 DETENT KIT



ASSEMBLY VIEW

MODEL CODE BREAKDOWN

CM 2 N* 2 - * * V * * * - 30 - A**B** - AB - N**

CM — MOBILE DIRECTIONAL VALVE

2 — SERIES DESIGNATION 2

N* — VALVE BANK MODIFICATION
- NO - NO MODIFICATION
- NS - ELECTRIC SWITCH ACTUATOR

2 — PORT CONNECTIONS
- 2 - 1.312 - 12 STRAIGHT THREAD (INLET)
  1.615 - 12 STRAIGHT THREAD (OUTLET)

***** — INLET BODY TYPE
- F - CARRY OVER PORT - NO RELIEF VALVE
- R - STD - RELIEF VALVE (PARTIAL FLOW BYPASS)
- K - STD - RELIEF VALVE (FULL FLOW BYPASS)

***** — SYSTEM RELIEF VALVE SETTING - PSI

05	500	20	2000
07	750	22	2250
10	1000	25	2500
12	1250	27	2750
15	1500	30	3000
17	1750	32	3250
		35	3500

V** — ADJUSTABLE SYSTEM RELIEF VALVE SETTING - PSI (OMIT IF NOT REQUIRED)

05	500	20	2000
07	750	22	2250
10	1000	25	2500
12	1250	27	2750
15	1500	30	3000
17	1750	32	3250
		35	3500

***** — SPOOL TYPE
- B - MOTOR
- C - FLOAT
- D - DOUBLE ACTING
- T - SINGLE ACTING
- W - REVERSE T SPOOL (SINGLE ACTING)

***** — SPOOL MODIFICATION (OMIT IF NOT REQ'D)
- 1 - DETENT FOR B, D, T or W SPOOLS

***** — OUTLET BODY TYPE
- E - CARRY OVER PORT
- L - STANDARD

30 — DESIGN

AB**** — 1st SPOOL
- A** - CHECK & PORT RELIEF ON END "A"
- B** - CHECK & PORT RELIEF ON END "B"

AB — 2nd SPOOL
- A - CHECK ONLY ON END "A"
- B - CHECK ONLY ON END "B"

N — 3rd SPOOL
- N - NO CHECK OR RELIEF IN PORT "A" OR "B"

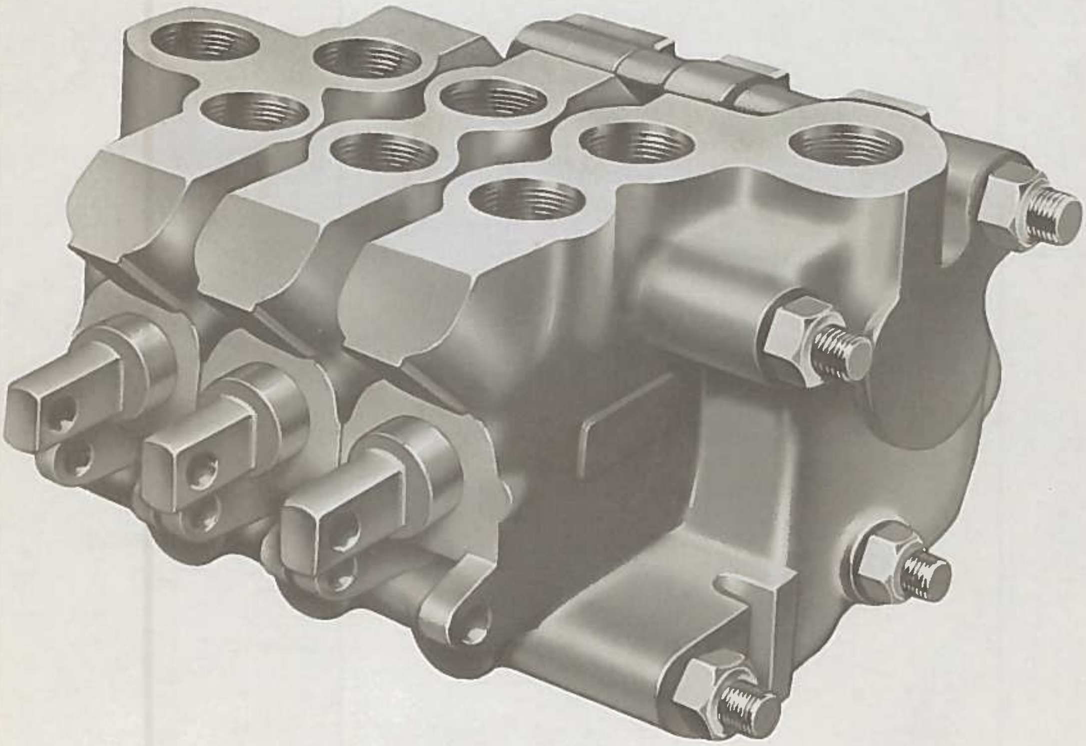
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

VICKERS

Service Parts Information

Multiple Unit Valves

CM3 Series -30 Design



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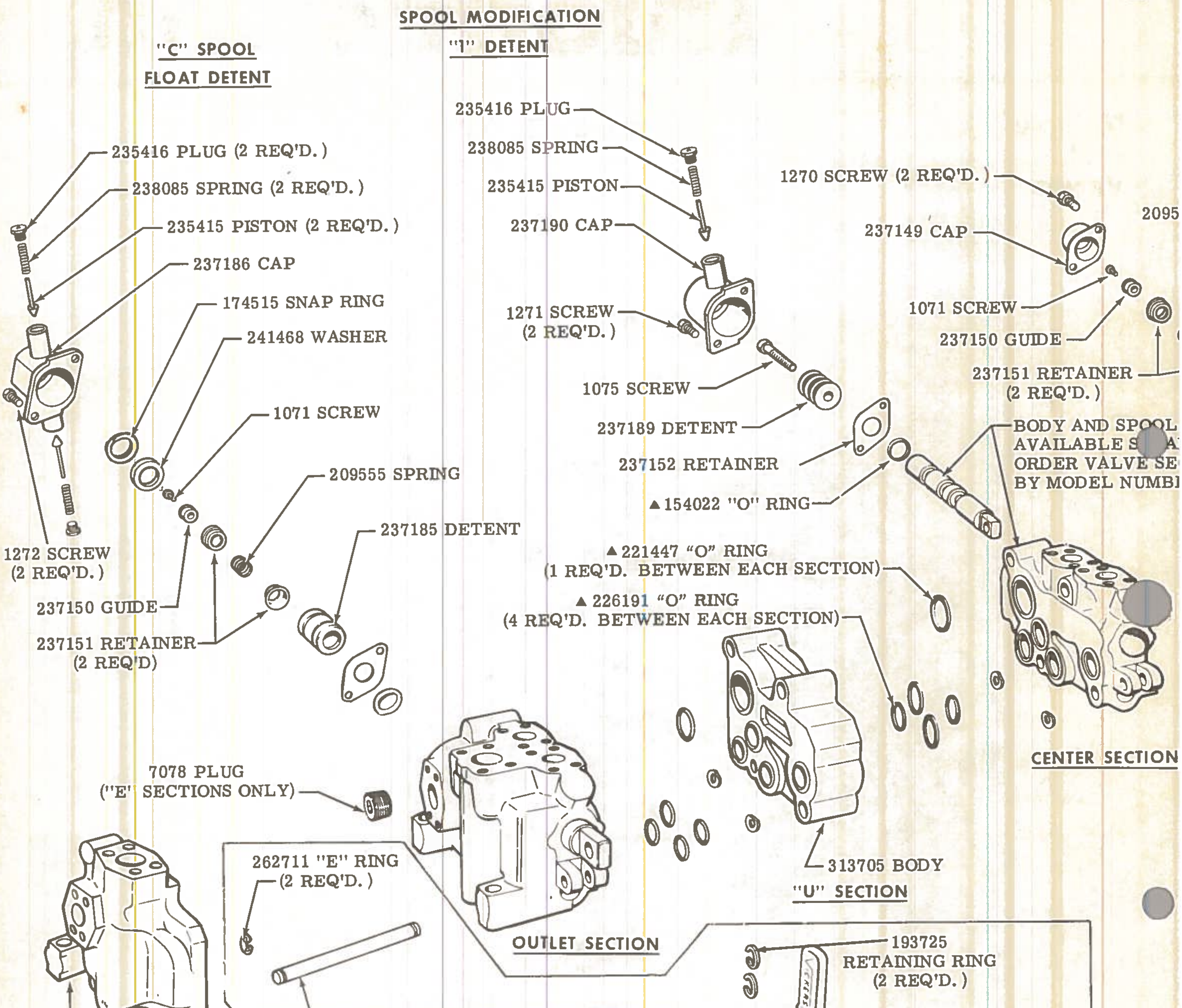
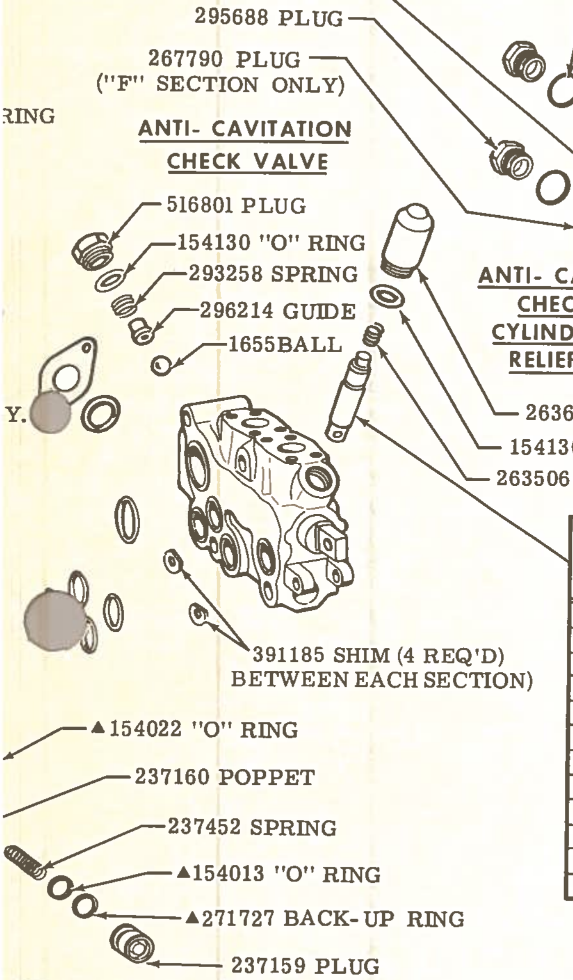


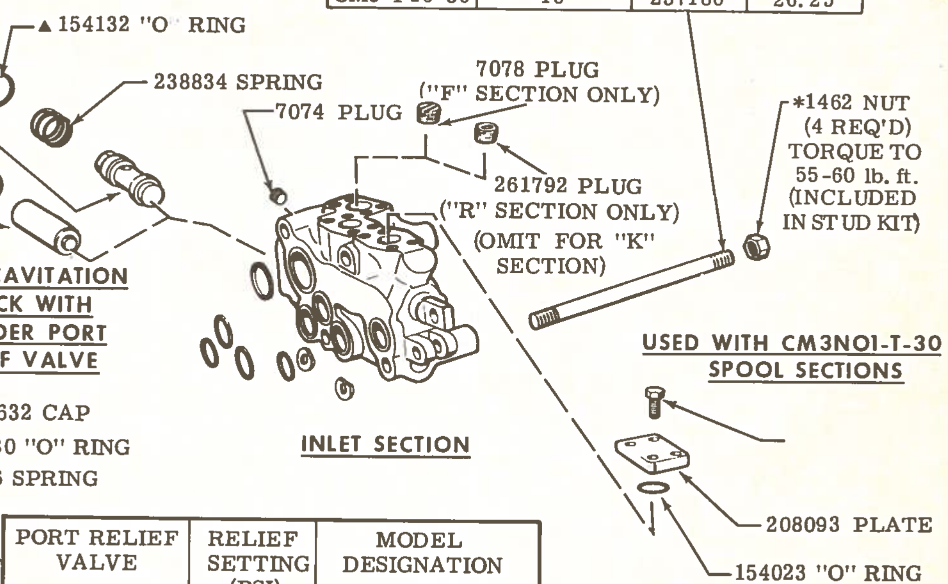
BODY	MODEL DESIGNATION
313703	CM3NO1-L-30
313733	CM3NO2-L-30
313883	CM3NO4-L-30

FULCRUM ROD	LENGTH (INCHES)	OPERATING SECTIONS	LEVER KIT MODEL
262721	2.781	1	CM3-H 1-30
263102	5.068	2	CM3-H 2-30
263103	7.568	3	CM3-H 3-30
263104	10.068	4	CM3-H 4-30
263105	12.568	5	CM3-H 5-30
263106	15.068	6	CM3-H 6-30
263107	17.568	7	CM3-H 7-30
263108	20.068	8	CM3-H 8-30
263109	22.568	9	CM3-H 9-30
263110	25.068	10	CM3-H10-30

CONTROL VALVE SUB-ASSY	RELIEF SETTING (PSI)	MODEL DESIGNATION
233015	500	CM3NO*-*05*-30
232836	750	CM3NO*-*07*-30
232837	1000	CM3NO*-*10*-30
233027	1250	CM3NO*-*12*-30
232838	1500	CM3NO*-*15*-30
232839	1750	CM3NO*-*17*-30
232840	2000	CM3NO*-*20*-30
233016	2250	CM3NO*-*22*-30
233017	2500	CM3NO*-*25*-30

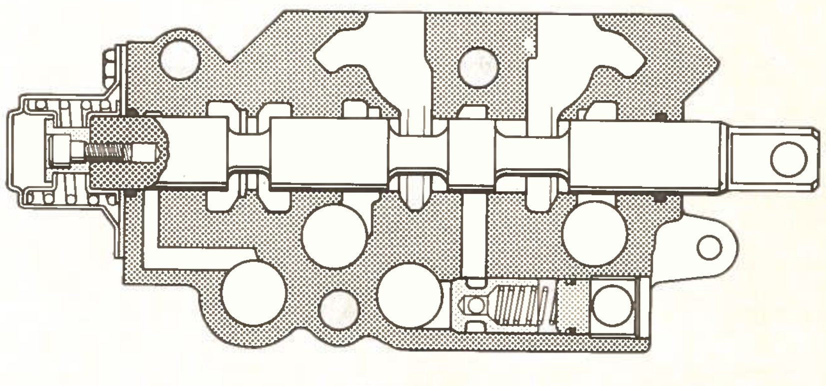
*STUD KIT MODEL	OPERATING SECTIONS	* STUD (4 REQ'D)	LENGTH (INCHES)
CM3-P 1-30	1	280784	5.75
CM3-P 2-30	2	237172	6.25
CM3-P 3-30	3	237173	8.75
CM3-P 4-30	4	237174	11.25
CM3-P 5-30	5	237175	13.75
CM3-P 6-30	6	237176	16.25
CM3-P 7-30	7	237177	18.75
CM3-P 8-30	8	237178	21.25
CM3-P 9-30	9	237179	23.75
CM3-P10-30	10	237180	26.25





PORT RELIEF VALVE	RELIEF SETTING (PSI)	MODEL DESIGNATION
263601	750	CM3NO*-*-30-*07
263602	1000	CM3NO*-*-30-*10
263603	1250	CM3NO*-*-30-*12
263604	1500	CM3NO*-*-30-*15
263605	1750	CM3NO*-*-30-*17
263606	2000	CM3NO*-*-30-*20
263607	2250	CM3NO*-*-30-*22
263608	2500	CM3NO*-*-30-*25
294688	2750	CM3NO*-*-30-*27
263610	3000	CM3NO*-*-30-*30
263611	3250	CM3NO*-*-30-*32
263612	3500	CM3NO*-*-30-*35

*THREAD STUDS FULLY INTO OUTLET SECTION FIRST, THEN COMPLETE ASSEMBLY OF VALVE.



▲= SERVICED IN SEAL KIT 922927

SEE SERVICE MANUAL M-2400-S FOR MAINTENANCE INFORMATION

MODEL CODE BREAKDOWN

CM 3 NO 1-* ** ** 1 *-30-A**B**-*-*(**)-N-B22**

MULTIPLE UNIT CONTROL VALVE MOBILE

SERIES DESIGNATION

VALVE BANK MODIFICATION
NO - NO MODIFICATION

PORT CONNECTIONS
1 - SAE 1 INCH 4-BOLT FLANGE INLET & CYLINDERS
SAE 1 1/4 4-BOLT FLANGE DISCHARGE

INLET BODY TYPE
F - CARRY OVER PORT - NO RELIEF VALVE
K - STANDARD - RELIEF (FULL FLOW BYPASS)
R - STANDARD - RELIEF VALVE (PARTIAL FLOW BYPASS)

SYSTEM RELIEF VALVE SETTING (P.S.I.)

05 - 500	12 - 1250	20 - 2000
07 - 750	15 - 1500	22 - 2250
10 - 1000	17 - 1750	25 - 2500

SPOOL TYPE
B - MOTOR
C - FLOAT
D - DOUBLE ACTING
T - SINGLE ACTING
U - SERIES SECTION (NO SPOOL)

SPOOL MODIFICATION
(OMIT IF NOT REQUIRED)
1 - DETENT FOR B, D, OR T SPOOLS

OUTLET BODY TYPE
L - STANDARD
E - CARRY OVER PORT

DESIGN NUMBER
30 - 3rd DESIGN

1st SPOOL
A** - CHECK AND PORT RELIEF ON END "A"
B** - CHECK AND PORT RELIEF ON END "B"
PORT RELIEF SETTING - P.S.I.

07 - 750	17 - 1750	27 - 2750
10 - 1000	20 - 2000	30 - 3000
12 - 1250	22 - 2250	32 - 3250
15 - 1500	25 - 2500	35 - 3500

2nd SPOOL
A - CHECK ONLY ON END "A"
B - CHECK ONLY ON END "B"

3rd SPOOL
A22 - CHECK AND PORT RELIEF SET AT 2250 P.S.I. ON END "A".
B - CHECK ONLY ON END "B"

4th SPOOL
N - NO CHECK OR RELIEF VALVE IN PORT "A" OR "B"

5th SPOOL
B22 - CHECK AND PORT RELIEF SET AT 2250 P.S.I. IN "B" PORT ONLY. NOTHING IN PORT "A".

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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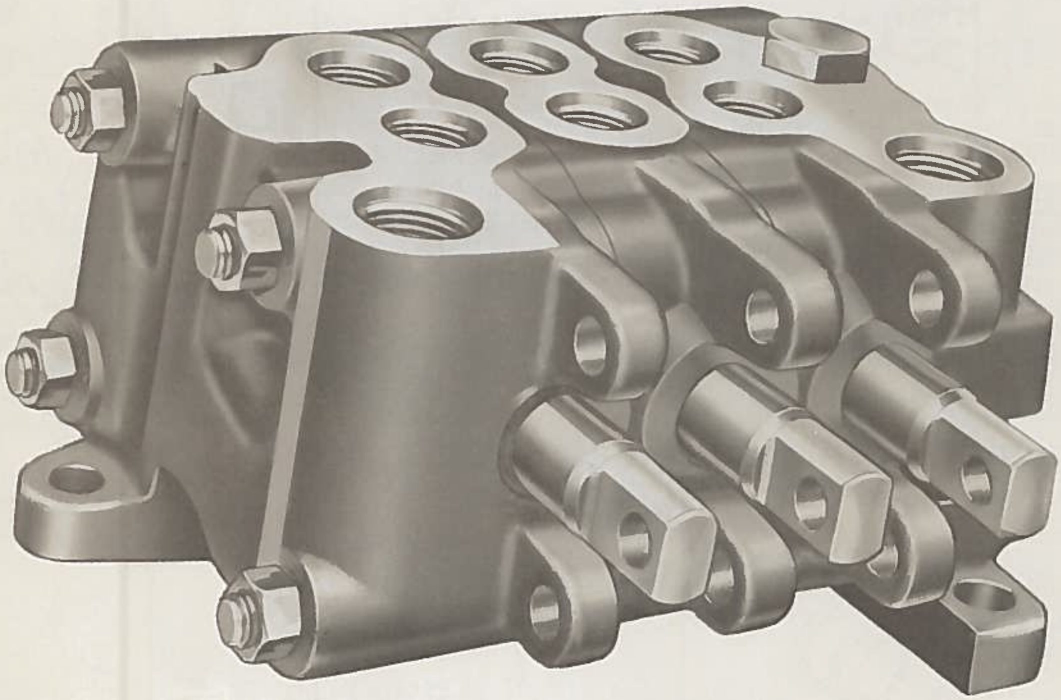
Service Parts Information

Multiple Unit Valves

CM11 Series -21 Design



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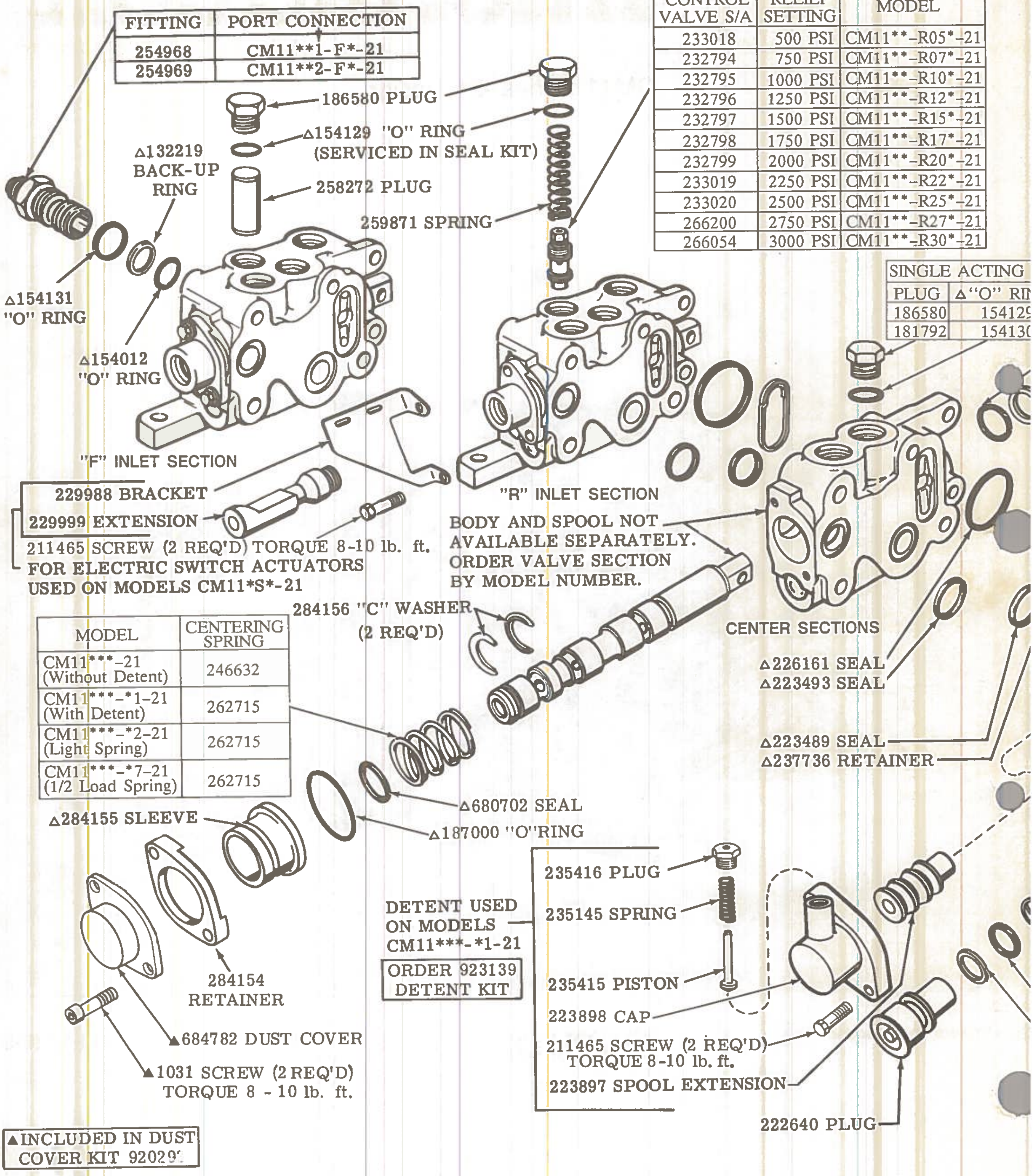


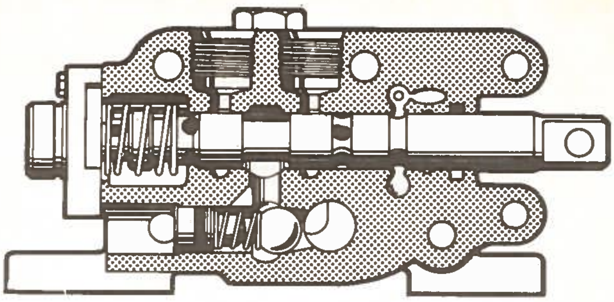
FITTING	PORT CONNECTION
254968	CM11**1-F*-21
254969	CM11**2-F*-21

CONTROL VALVE S/A	RELIEF SETTING	MODEL
233018	500 PSI	CM11**-R05*-21
232794	750 PSI	CM11**-R07*-21
232795	1000 PSI	CM11**-R10*-21
232796	1250 PSI	CM11**-R12*-21
232797	1500 PSI	CM11**-R15*-21
232798	1750 PSI	CM11**-R17*-21
232799	2000 PSI	CM11**-R20*-21
233019	2250 PSI	CM11**-R22*-21
233020	2500 PSI	CM11**-R25*-21
266200	2750 PSI	CM11**-R27*-21
266054	3000 PSI	CM11**-R30*-21

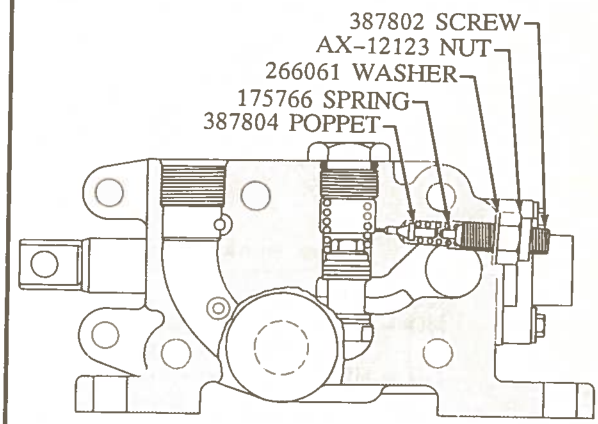
SINGLE ACTING	
PLUG	△"O" RI
186580	15412
181792	15413

MODEL	CENTERING SPRING
CM11***-21 (Without Detent)	246632
CM11***-*1-21 (With Detent)	262715
CM11***-*2-21 (Light Spring)	262715
CM11***-*7-21 (1/2 Load Spring)	262715

FULCRUM ROD	OVERALL LENGTH	MODEL	OPERATING SECTIONS
245491	1.766''	CM11-H1-20	1
245492	3.391''	CM11-H2-20	2
245493	4.891''	CM11-H3-20	3
245494	6.391''	CM11-H4-20	4
245495	7.891''	CM11-H5-20	5
245496	9.391''	CM11-H6-20	6
245497	10.891''	CM11-H7-20	7
245498	12.391''	CM11-H8-20	8
245499	13.891''	CM11-H9-20	9
245500	15.391''	CM11-H10-20	10

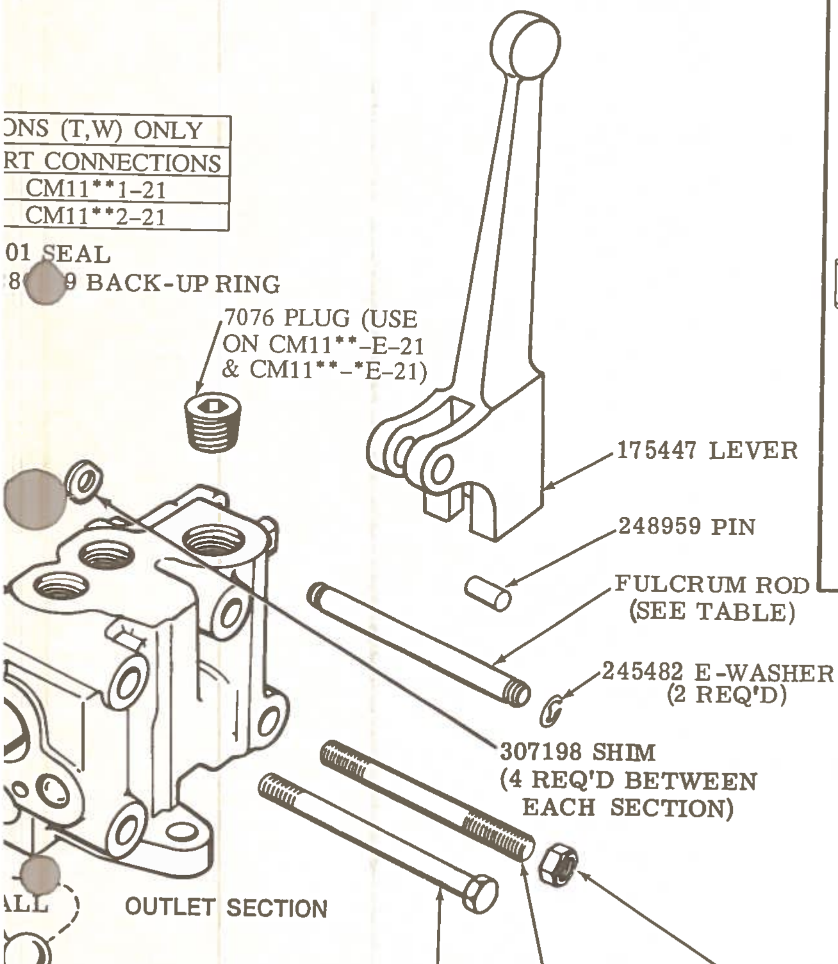


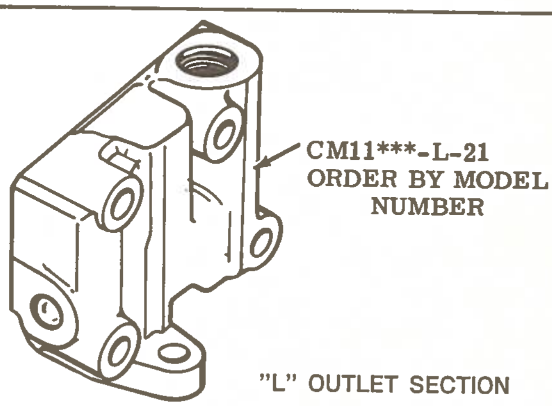
CM11NO*-R**V** Option



NOTE
Adjust 387802 screw to specified relief setting (V**) and tighten AX-12123 jam nut. (V**) value must be 250 PSI below (R**) value.

ONS (T,W) ONLY
RT CONNECTIONS
CM11**1-21
CM11**2-21





"L" OUTLET SECTION

ΔINCLUDED IN 920278 SEAL KIT

F3 EQUIVALENT SEAL KIT 923093

223388 SPRING

4008 "O" RING

71722 BACK-UP RING

SCREW (4 REQ'D)	STUD (4 REQ'D)	OVERALL LENGTH	NUT TORQUE 17 lb. ft.	MODEL	OPERATING SECTIONS
146835			1454 (4 REQ'D)	CM11-P1-20	1
214672				CM11-P2-20	2
	223153	7.38''	1454 (8 REQ'D)	CM11-P3-20	3
	223154	8.88''		CM11-P4-20	4
	223155	10.38''		CM11-P5-20	5
	223156	11.88''		CM11-P6-20	6
	223157	13.38''		CM11-P7-20	7
	223158	14.88''		CM11-P8-20	8
	223159	16.38''		CM11-P9-20	9
	223160	17.88''		CM11-P10-20	10

MODEL CODE BREAKDOWN

CM 11 ** * – * ** V** *** * **–21

1 2 3 4 5 6 7 8 9 10 11

1 Multiple Unit Control Valve

2 Series

3 Valve Bank Modification

- NO – No Modification
- ND – Standard Sections – Dust Covers
- NS – Standard Sections – Electrical Switch Actuators
- ZO – Narrow Bypass Sections – No Modification
- ZD – Narrow Bypass Sections – Dust Covers
- ZS – Narrow Bypass Sections – Electrical Switch Actuators

4 Port Connections

- 1 – 7/8–14 UNF – 2B Inlet & Discharge Ports – 3/4–16 UNF – 2B Cylinder Ports
- 2 – 1 1/16–14 UNF – 2B Inlet & Discharge Ports – 7/8–14 UNF – 2B Cylinder Ports

5 Inlet Body Type

- F – Carryover Port – No Relief Valve
- R – Standard – Relief Valve (Partial Flow Bypass)
- K – Standard – Relief Valve (Full Flow Bypass)
- J – Standard – Relief Valve (Partial Flow Bypass)

6 System Relief Valve Setting – PSI

- 05 – 500 PSI
- 07 – 750 PSI
- 10 – 1000 PSI
- 12 – 1250 PSI
- 15 – 1500 PSI
- 17 – 1750 PSI
- 20 – 2000 PSI
- 22 – 2250 PSI
- 25 – 2500 PSI
- 27 – 2750 PSI
- 30 – 3000 PSI

7 Adjustable System Relief Valve Setting – PSI (Omit if not required)

- V05 – 500 PSI
- V07 – 750 PSI
- V10 – 1000 PSI
- V12 – 1250 PSI
- V15 – 1500 PSI
- V17 – 1750 PSI
- V20 – 2000 PSI
- V22 – 2250 PSI
- V25 – 2500 PSI

8 Spool Type

- A6 – Counterbalance
- B – Motor
- C – Float
- D – Double Acting
- D3 – Dual Function
- D4 – Special Metering
- D5 – Combined & B Spool Functions
- T – Single Acting
- W3 – Safety Interlock

9 Spool Modification (Omit if not required)

- 1 – Detent For Any Spool
- 2 – Light Centering Spring
- 7 – Half Load Centering Spring

10 Outlet Body Type

- L – Standard
- E – Carryover Port
- E1 – E Section with Additional Outlet Port

11 Design

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

Litho in U. S. A.

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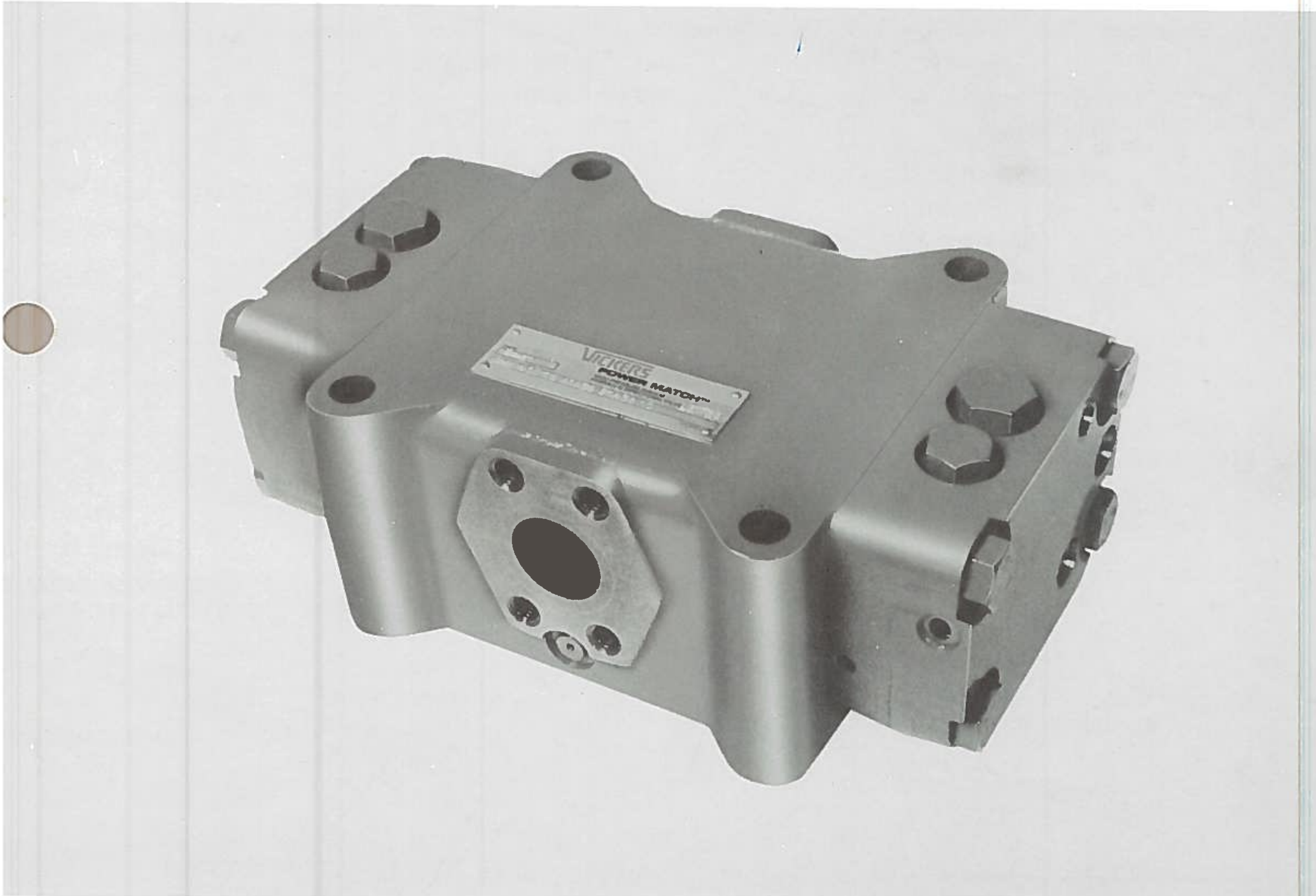
Service Parts Information

Power Match™ Directional Valve With Load Sensing & Pressure Compensation

CMX400 -10 Design



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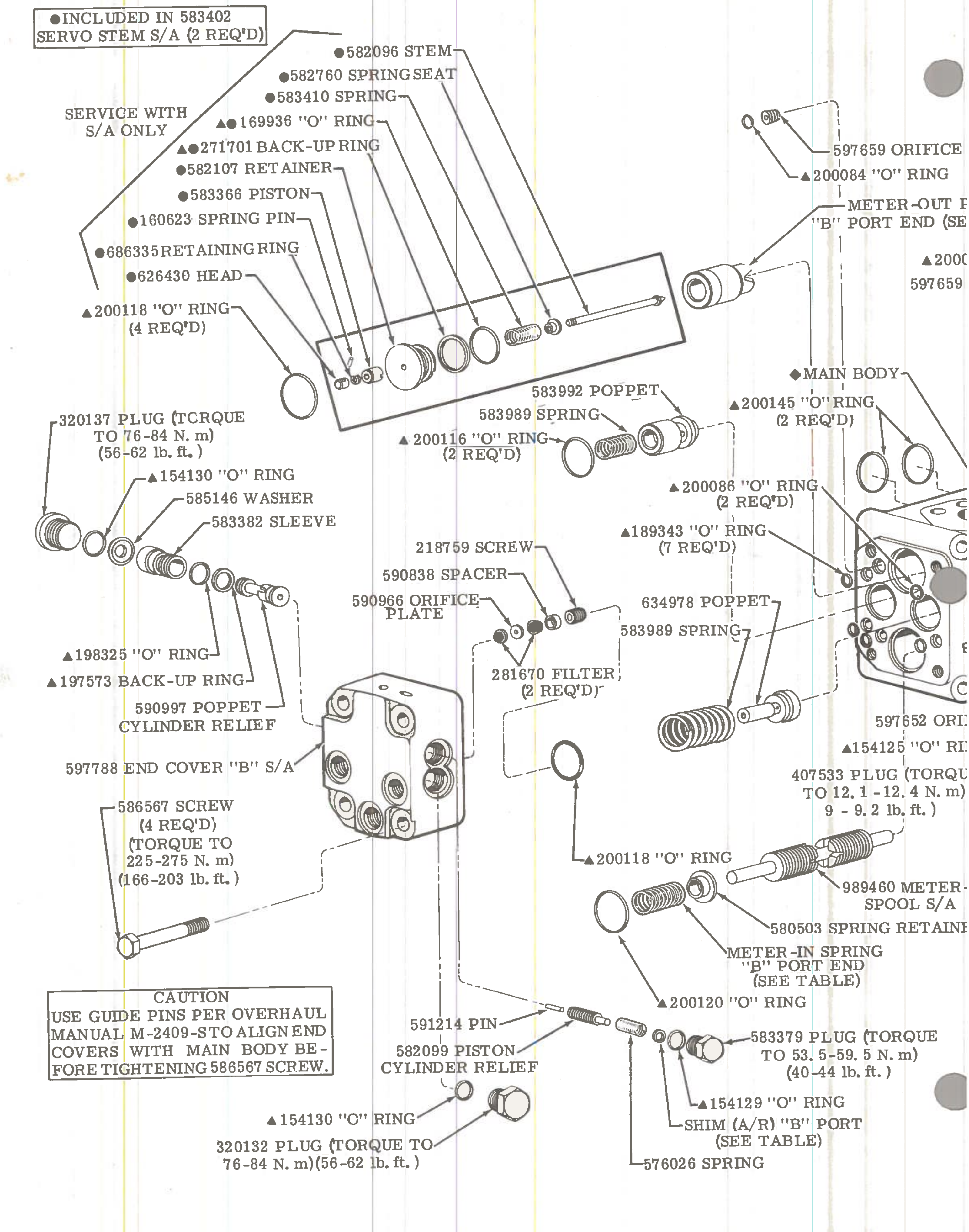
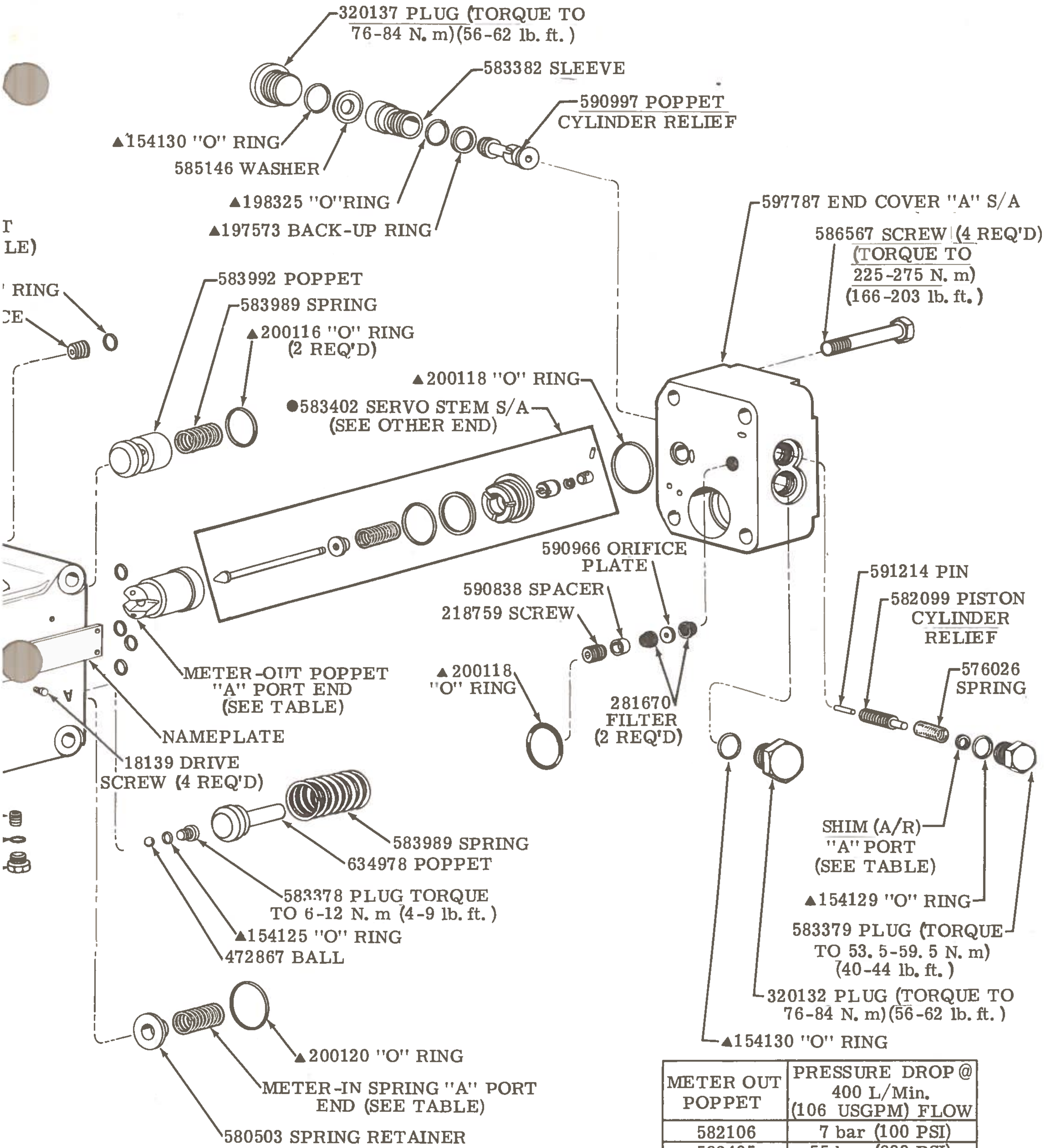

●INCLUDED IN 583402
SERVO STEM S/A (2 REQ'D)
SERVICE WITH S/A ONLY
●582096 STEM
●582760 SPRING SEAT
●583410 SPRING
▲●169936 "O" RING
▲●271701 BACK-UP RING
●582107 RETAINER
●583366 PISTON
●160623 SPRING PIN
●686335 RETAINING RING
●626430 HEAD
▲200118 "O" RING (4 REQ'D)
597659 ORIFICE
▲200084 "O" RING
METER-OUT P
"B" PORT END (SE
▲2000
597659
◆MAIN BODY
583992 POPPET
583989 SPRING
▲200116 "O" RING (2 REQ'D)
▲200145 "O" RING (2 REQ'D)
320137 PLUG (TORQUE TO 76-84 N. m) (56-62 lb. ft.)
▲154130 "O" RING
585146 WASHER
583382 SLEEVE
▲200086 "O" RING (2 REQ'D)
▲189343 "O" RING (7 REQ'D)
218759 SCREW
590838 SPACER
590966 ORIFICE PLATE
634978 POPPET
583989 SPRING
▲198325 "O" RING
▲197573 BACK-UP RING
281670 FILTER (2 REQ'D)
590997 POPPET CYLINDER RELIEF
597788 END COVER "B" S/A
597652 ORI
▲154125 "O" RI
407533 PLUG (TORQU TO 12.1 - 12.4 N. m) 9 - 9.2 lb. ft.)
586567 SCREW (4 REQ'D) (TORQUE TO 225-275 N. m) (166-203 lb. ft.)
▲200118 "O" RING
989460 METER- SPOOL S/A
580503 SPRING RETAINE
METER-IN SPRING "B" PORT END (SEE TABLE)
▲200120 "O" RING
CAUTION
USE GUIDE PINS PER OVERHAUL MANUAL M-2409-S TO ALIGN END COVERS WITH MAIN BODY BEFORE TIGHTENING 586567 SCREW.
591214 PIN
582099 PISTON CYLINDER RELIEF
583379 PLUG (TORQUE TO 53.5-59.5 N. m) (40-44 lb. ft.)
▲154129 "O" RING
▲154130 "O" RING
SHIM (A/R) "B" PORT (SEE TABLE)
320132 PLUG (TORQUE TO 76-84 N. m)(56-62 lb. ft.)
576026 SPRING



METER OUT POPPET	PRESSURE DROP @ 400 L/Min. (106 USGPM) FLOW
582106	7 bar (100 PSI)
583405	55 bar (800 PSI)

▲INCLUDED IN 920231 SEAL KIT

◆NOT AVAILABLE AS A SERVICE PART

METER IN SPRING		
SPRING	PORT	CRACKING PRESSURE
583411	A and/or B	5 bar (75 PSI)
583409	A and/or B	10 bar (150 PSI)

SHIMS - CYLINDER RELIEF			
THICKNESS mm	THICKNESS inch	SHIM KIT	APPROXIMATE ΔP PER SHIM
0. 13	. 005	941385	6. 9 bar (100 PSI)
0. 25	. 010		13. 8 bar (200 PSI)
0. 76	. 030		41. 4 bar (800 PSI)

MODEL CODE BREAKDOWN

CMX 400 - ** - A ** - B **** - 10**

- **CMX** — DIRECTIONAL VALVE LOAD SENSING PRESSURE COMPENSATED
- **400** — VALVE SERIES NOMINAL FLOW CAPACITY
  400 - 400 L/Min. (106 USGPM)
- **** (first)** — MOUNTING TYPE
  1 - ACTUATOR
- **** (second)** — CONTROL TYPE
  S - STANDARD
- **A** — PORT IDENTIFICATION "A" PORT
- ***** — METER OUT ELEMENT (FLOW DIRECTION FROM "A" TO "T" PORT)
  1 - 7 bar (100 PSI)
  8 - 56 bar (800 PSI)
  0 - NONE
- ***** — METER-IN CRACKING PRESSURE (FLOW DIRECTION FROM "P" TO "A" PORT)
  A - 5 bar (75 PSI)
  B - 10 bar (150 PSI)
- ****** — PORT RELIEF FLOW DIRECTION (FROM "A" TO "T" PORT)
  00 - NO RELIEF
  14 THRU 41 CONSECUTIVE NUMBERS (140 bar THRU 410 bar). ONE (1) bar EQUALS 14. 5 PSI.
- **B** — PORT IDENTIFICATION "B" PORT
- ***** — METER-OUT ELEMENT (FLOW DIRECTION FROM "B" TO "T" PORT)
  1 - 7 bar (100 PSI)
  8 - 56 bar (800 PSI)
  0 - NONE
- ***** — METER-IN CRACKING PRESSURE (FLOW DIRECTION FROM "P" TO "B" PORT)
  A - 5 bar (75 PSI)
  B - 10 bar (150 PSI)
- ****** — PORT RELIEF FLOW DIRECTION (FROM "A" TO "T" PORT)
  00 - NO RELIEF
  14 THRU 41 CONSECUTIVE NUMBERS, (140 bar THRU 410 bar). (1) bar EQUALS 14. 5 PSI.
- **10** — DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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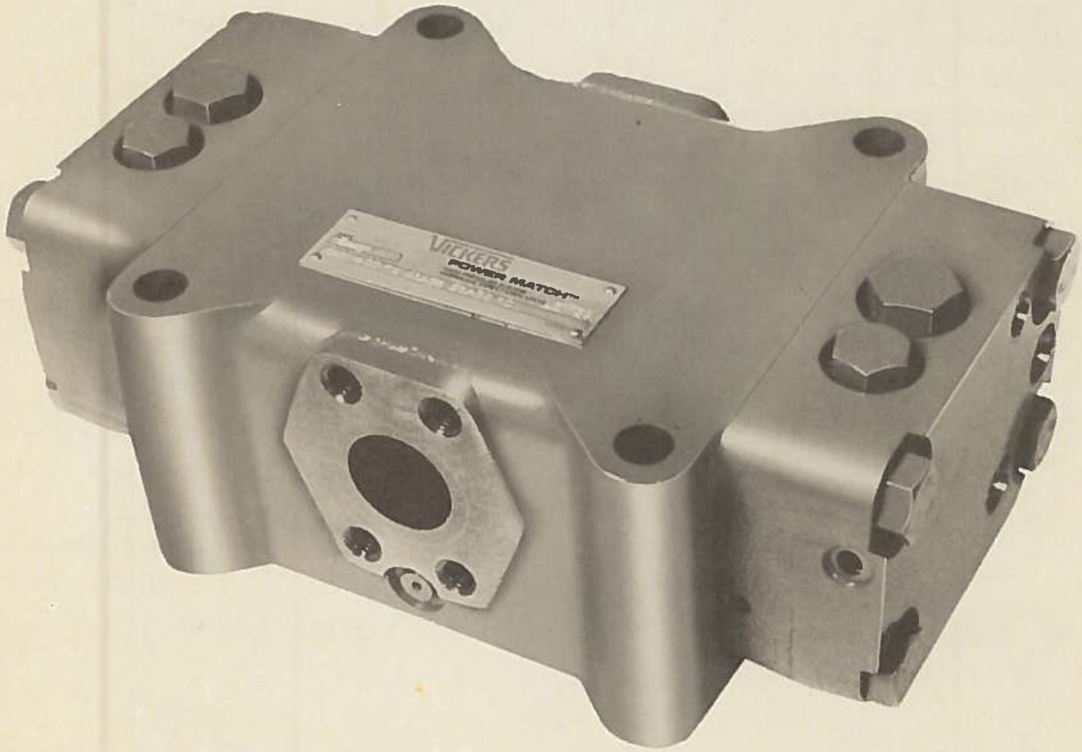
Service Parts Information

Power Match™ Directional Valve With Load Sensing & Pressure Compensation

CMX250 -10 Design



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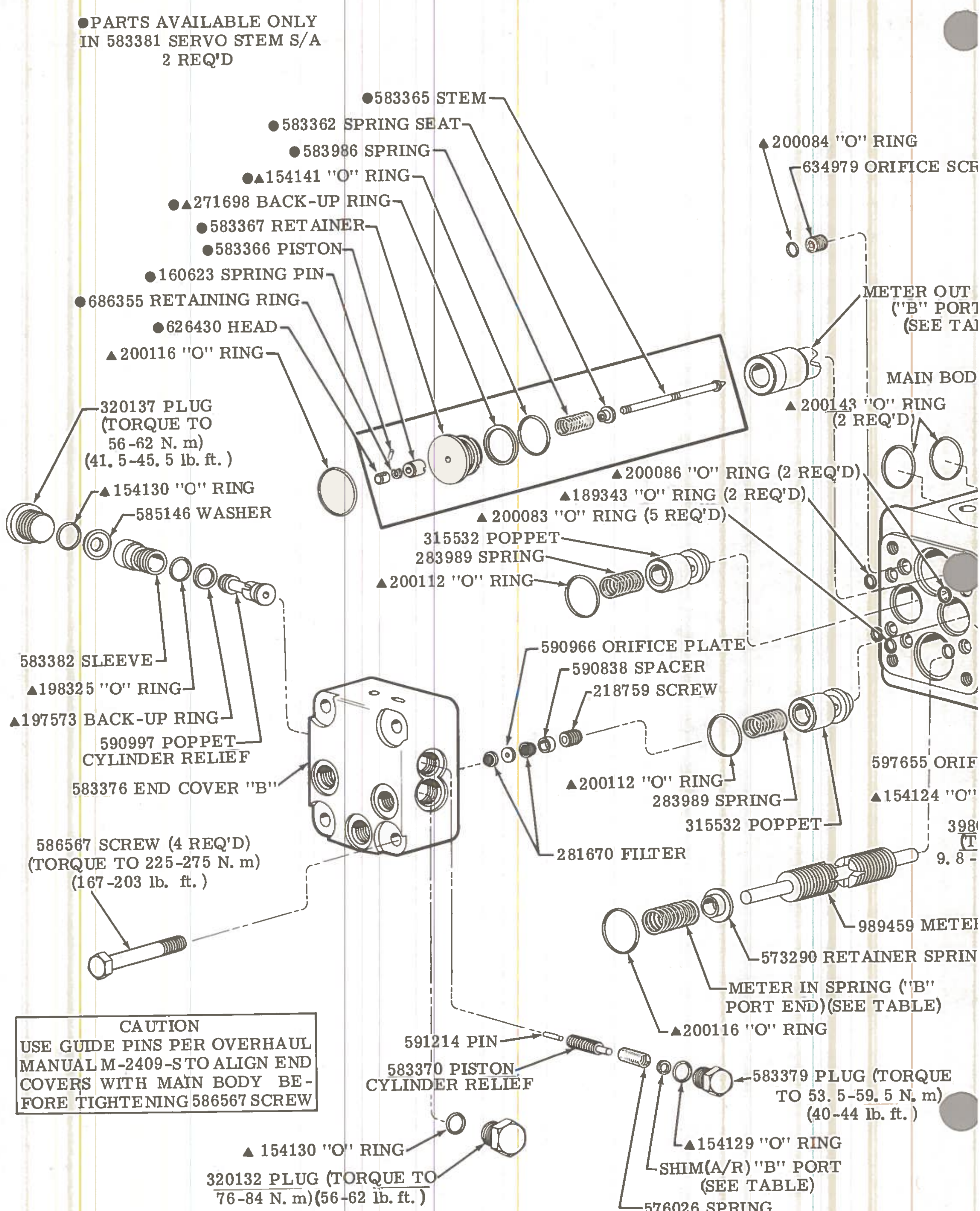
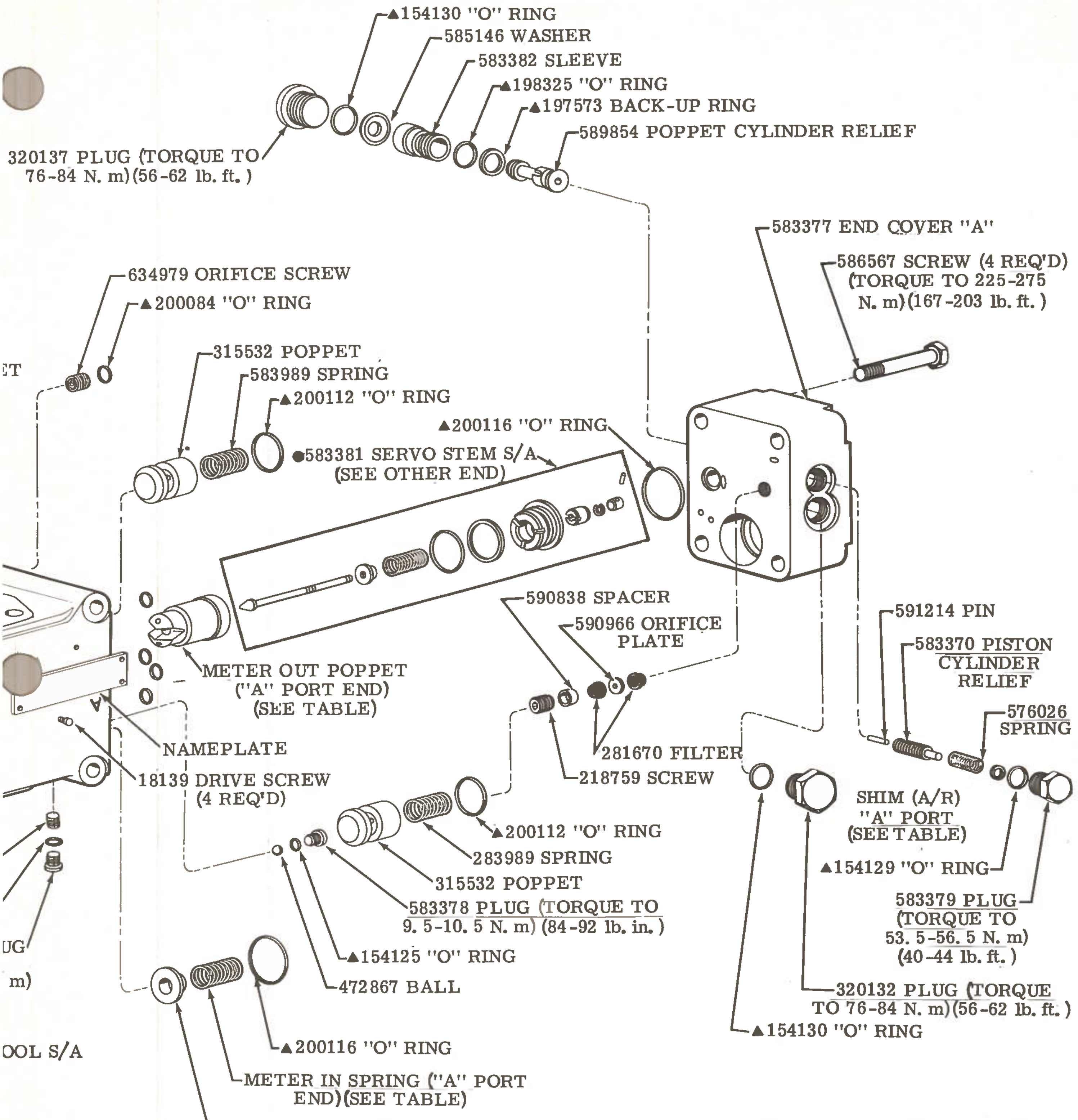


CAUTION
USE GUIDE PINS PER OVERHAUL MANUAL M-2409-S TO ALIGN END COVERS WITH MAIN BODY BEFORE TIGHTENING 586567 SCREW



METER OUT POPPET A & B PORT	PRESSURE DROP @ 250 L/Min. (66 GPM) FLOW
573311	7 bar (100 PSI)
583388	55 bar (800 PSI)

▲INCLUDED IN 920230 SEAL KIT

◆NOT AVAILABLE AS A SERVICE PART

METER IN SPRING		
SPRING	PORT	CRACKING PRESSURE
583421	A and/or B	5 bar (75 PSI)
573302	A and/or B	10 bar (150 PSI)

SHIMS - CYLINDER RELIEF		
Thickness mm(inch)	SHIM	Δ P/shim(approx.)
0. 13 (. 005)	941385	6. 9 bar (100 PSI)
0. 25 (. 010)		13. 8 bar (200 PSI)
0. 76 (. 030)		41. 4 bar (600 PSI)

MODEL CODE BREAKDOWN

CMX * - ** - A **** - B **** - 10**

DIRECTIONAL VALVE LOAD SENSING PRESSURE COMPENSATED (CMX)

VALVE SERIES
NOMINAL FLOW CAPACITY
250 - 250 L/Min. (66 GPM)

MOUNTING TYPE
1 -ACTUATOR

CONTROL TYPE
S - STANDARD

PORT IDENTIFICATION
"A" PORT

METER OUT ELEMENT
(FLOW DIRECTION 'A' -'T' PORT)
1 - 7 bar (100 PSI)
8 - 56 bar (800 PSI)
0 - NONE

METER IN CRACKING PRESSURE
(FLOW DIRECTION 'P' - 'A' PORT)
A - 5 bar (75 PSI)
B - 10 bar (150 PSI)

PORT RELIEF (FLOW DIRECTION 'A' - 'T' PORT)
00 - NONE
14 - 138 bar (2000 PSI)
17 - 172 bar (2500 PSI)
21 - 207 bar (3000 PSI)
23 - 228 bar (3300 PSI)
24 - 240 bar (3500 PSI)
27 - 275 bar (4000 PSI)
31 - 310 bar (4500 PSI)
34 - 345 bar (5000 PSI)
36 - 362 bar (5250 PSI)
37 - 370 bar (5360 PSI)
38 - 380 bar (5500 PSI)

PORT IDENTIFICATION
"B" PORT

METER OUT ELEMENT
(FLOW DIRECTION 'B' -'T' PORT)
1 - 7 bar (100 PSI)
8 - 56 bar (800 PSI)
0 - NONE

METER IN CRACKING PRESSURE
(FLOW DIRECTION 'P' -'B' PORT)
A - 5 bar (75 PSI)
B - 10 bar (150 PSI)

PORT RELIEF (FLOW DIRECTION 'B' -'T' PORT)
00 - NONE
14 - 138 bar (2000 PSI)
17 - 172 bar (2500 PSI)
21 - 207 bar (3000 PSI)
23 - 228 bar (3300 PSI)
24 - 240 bar (3500 PSI)
27 - 275 bar (4000 PSI)
31 - 310 bar (4500 PSI)
34 - 345 bar (5000 PSI)
36 - 362 bar (5250 PSI)
37 - 370 bar (5360 PSI)
38 - 380 bar (5500 PSI)

DESIGN (10)

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

(3) 9(

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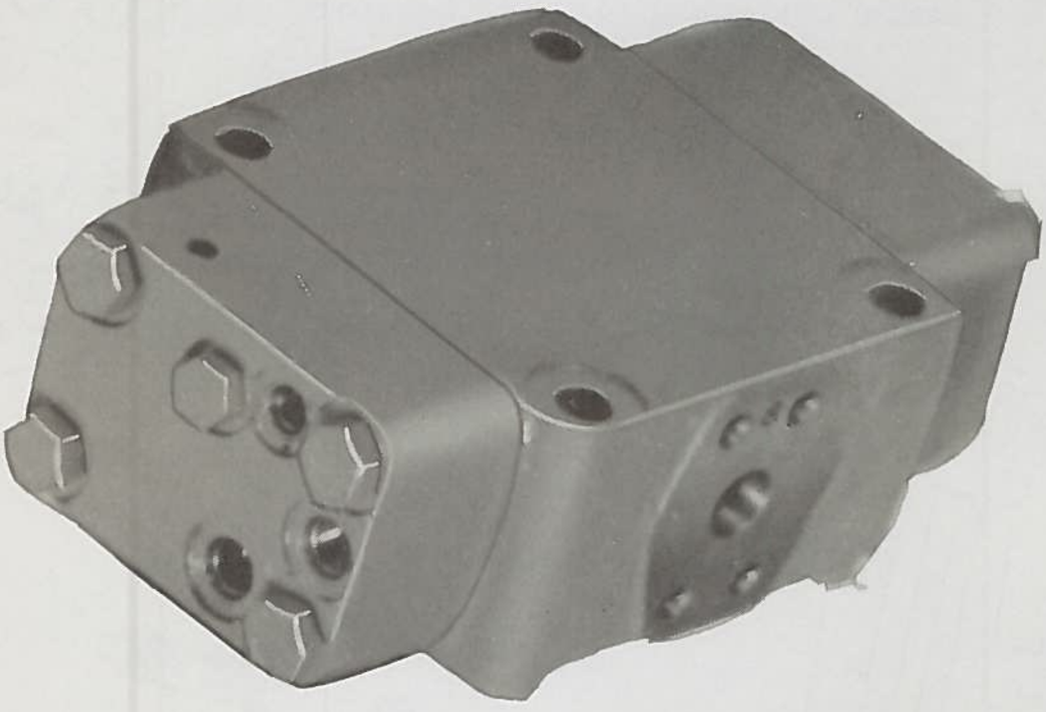
Service Parts Information

Power Match™ Directional Valve With Load Sensing & Pressure Compensation

CMX160-*S-A****-B****-10



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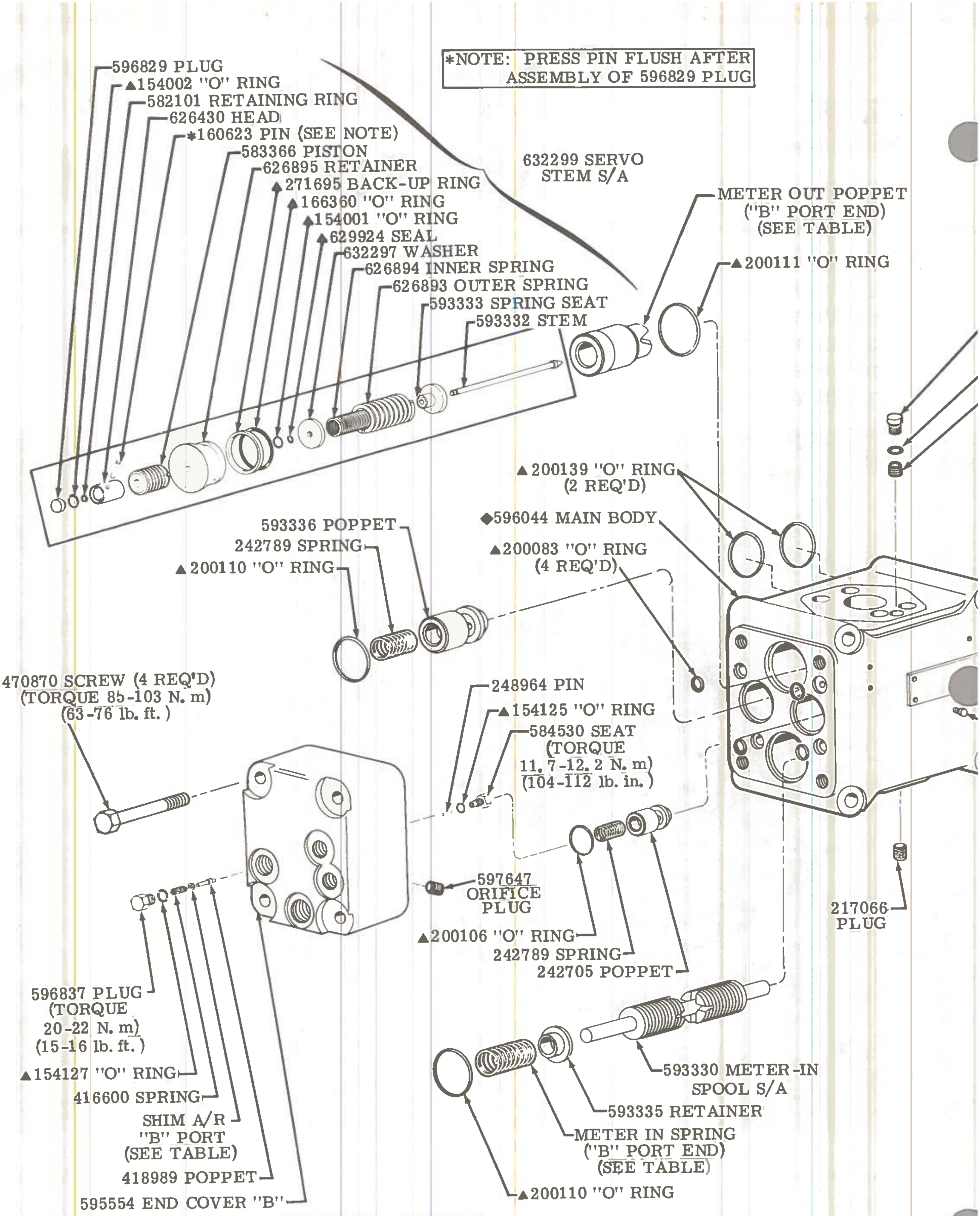
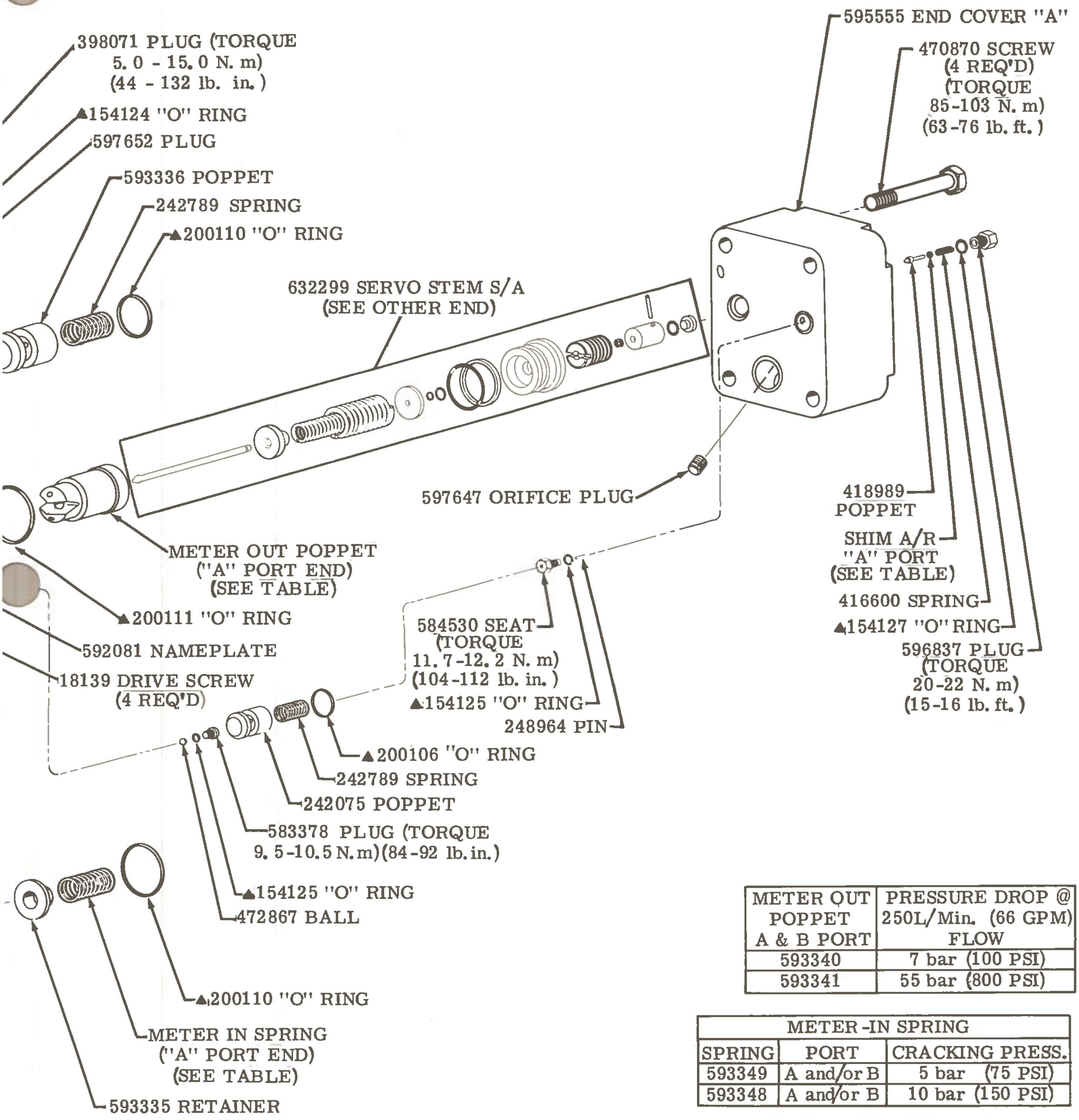
72



CAUTION
USE GUIDE PINS PER OVERHAUL MANUAL M-2409-S TO ALIGN END COVERS WITH MAIN BODY BEFORE TIGHTENING 470870 SCREW.



METER OUT POPPET A & B PORT	PRESSURE DROP @ 250L/Min. (66 GPM) FLOW
593340	7 bar (100 PSI)
593341	55 bar (800 PSI)

METER -IN SPRING		
SPRING	PORT	CRACKING PRESS.
593349	A and/or B	5 bar (75 PSI)
593348	A and/or B	10 bar (150 PSI)

▲INCLUDED IN SEAL KIT 920273

◆NOT AVAILABLE AS A SERVICE PART

SHIMS - CYLINDER RELIEF			
THICKNESS		SHIM KIT	ΔP/SHIM (approx.)
mm	inch		
0. 05	.002	926284	3. 8 bar (55 PSI)
0. 25	.010		19. 0 bar (275 PSI)
0. 45	.018		34. 2 bar (496 PSI)
0. 70	.028		53. 2 bar (771 PSI)

MODEL CODE BREAKDOWN

CMX*-**-A****-B****-10-*****

DIRECTIONAL VALVE LOAD SENSING PRESSURE COMPENSATED

VALVE SERIES NOMINAL FLOW CAPACITY
160 - 160 L/Min. (42 GPM)

MOUNTING TYPE
1 - ACTUATOR

CONTROL TYPE
S - STANDARD

PORT IDENTIFICATION
"A" PORT

METER OUT ELEMENT
(FLOW DIRECTION 'A'-'T' PORT)
1 - 7 bar (100 PSI)
8 - 56 bar (800 PSI)
0 - NONE

METER IN CRACKING PRESSURE
(FLOW DIRECTION 'P'-'A' PORT
A - 5 bar (75 PSI)
B - 10 bar (150 PSI)

PORT RELIEF (FLOW DIRECTION 'A' - 'T' PORT)
00 - NONE
14 - 140 bar (2030 PSI)
15 - 150 bar (2175 PSI)
16 - 160 bar (2320 PSI)
17 - 170 bar (2465 PSI)
18 - 180 bar (2610 PSI)
19 - 190 bar (2755 PSI)
20 - 200 bar (2900 PSI)
21 - 210 bar (3045 PSI)
23 - 230 bar (3335 PSI)
24 - 240 bar (3480 PSI)
27 - 270 bar (3915 PSI)
31 - 310 bar (4495 PSI)
34 - 340 bar (4930 PSI)
36 - 360 bar (5220 PSI)
37 - 370 bar (5365 PSI)
38 - 380 bar (5510 PSI)
39 - 390 bar (5655 PSI)
40 - 400 bar (5800 PSI)
41 - 410 bar (5945 PSI)

14 THRU 41 CONSECUTIVE NUMBERS 140 bar THRU 410 bar IN INCREMENTS OF 10 bar ie. 2030 PSI THRU 5945 PSI IN INCREMENTS OF 145 PSI.

PORT IDENTIFICATION
"B" PORT

METER OUT ELEMENT
(FLOW DIRECTION 'B' - 'T' PORT)
1 - 7 bar (100 PSI)
8 - 56 bar (800 PSI)
0 - NONE

METER IN CRACKING PRESSURE
(FLOW DIRECTION 'P'-'B' PORT)
A - 5 bar (75 PSI)
B - 10 bar (150 PSI)

PORT RELIEF (FLOW DIRECTION 'B' - 'T' PORT)
00 - NONE
14 - 140 bar (2030 PSI)
15 - 150 bar (2175 PSI)
16 - 160 bar (2320 PSI)
17 - 170 bar (2465 PSI)
18 - 180 bar (2610 PSI)
19 - 190 bar (2755 PSI)
20 - 200 bar (2900 PSI)
21 - 210 bar (3045 PSI)
23 - 230 bar (3335 PSI)
24 - 240 bar (3480 PSI)
27 - 270 bar (3915 PSI)
31 - 310 bar (4495 PSI)
34 - 340 bar (4930 PSI)
36 - 360 bar (5220 PSI)
37 - 370 bar (5365 PSI)
38 - 380 bar (5510 PSI)
39 - 390 bar (5655 PSI)
40 - 400 bar (5800 PSI)
41 - 410 bar (5945 PSI)

14 THRU 41 CONSECUTIVE NUMBERS 140 bar THRU 410 bar IN INCREMENTS OF 10 bar ie. 2030 PSI THRU 5945 PSI IN INCREMENTS OF 145 PSI.

DESIGN

SPECIAL MODIFICATION SUFFIX

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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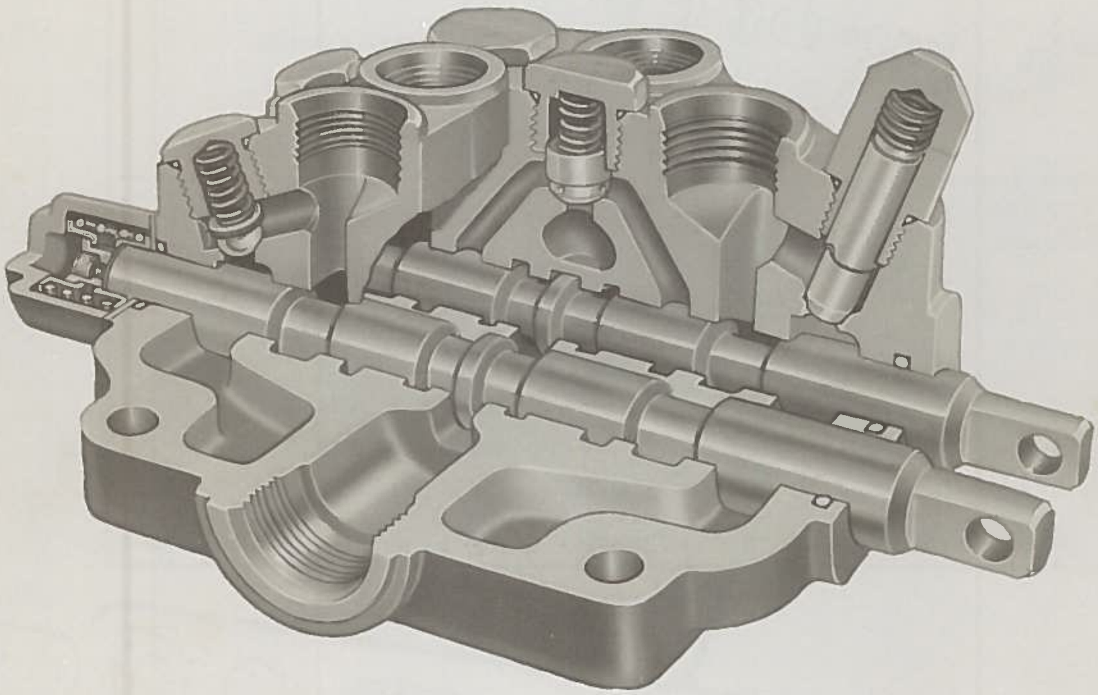
Service Parts Information

Directional Valves

CMD40 Series – 10 Design



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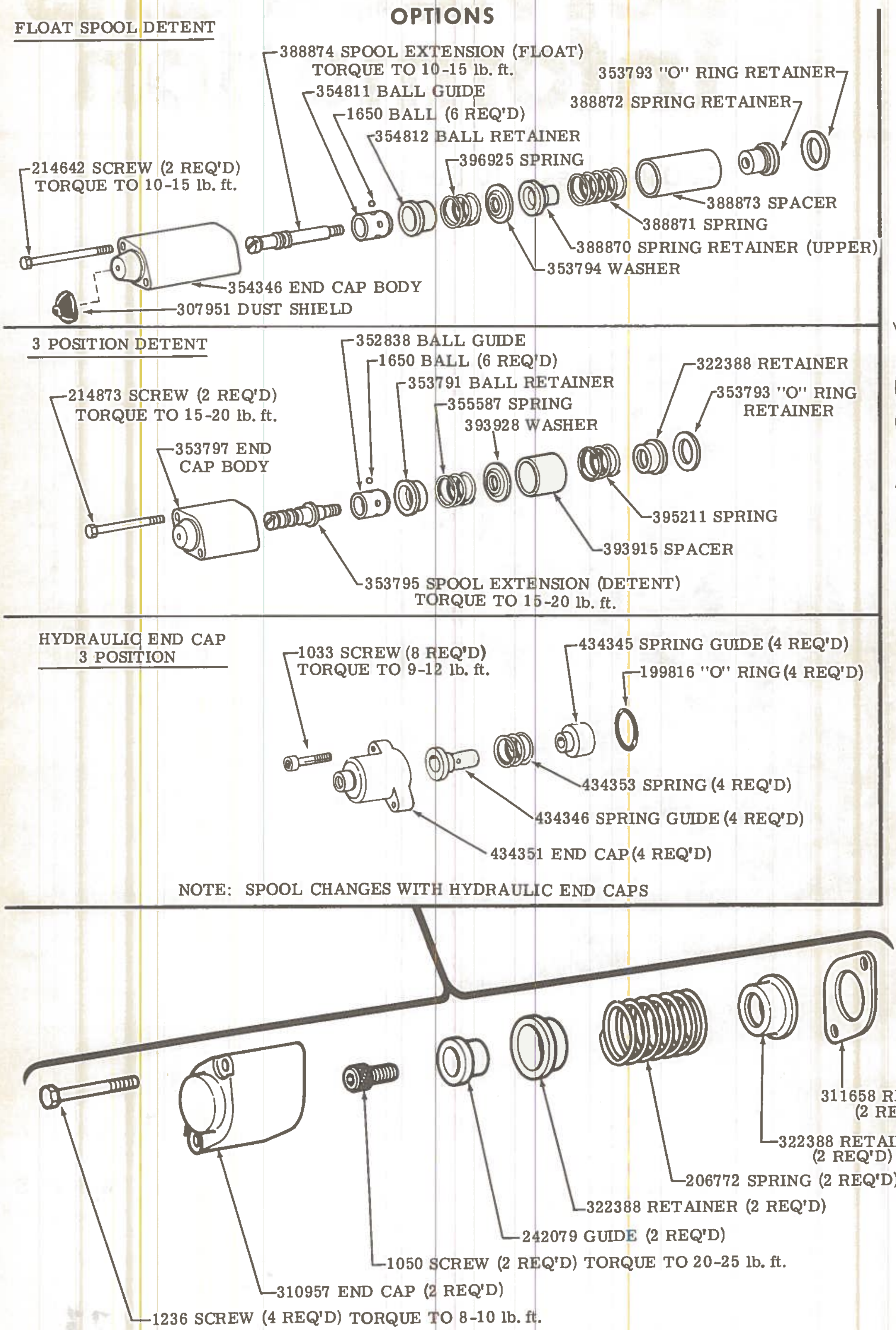
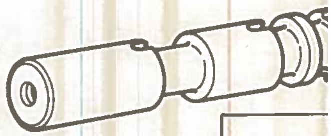
OPTIONS



MODEL DESIGNATION
CMD40**-*07*-
CMD40**-*10*-
CMD40**-*12*-
CMD40**-*15*-
CMD40**-*17*-
CMD40**-*20*-
CMD40**-*22*-
CMD40**-*25*-
CMD40**-*27*-
CMD40**-*30*-

SEE ASSEMBLY PROCEDUR

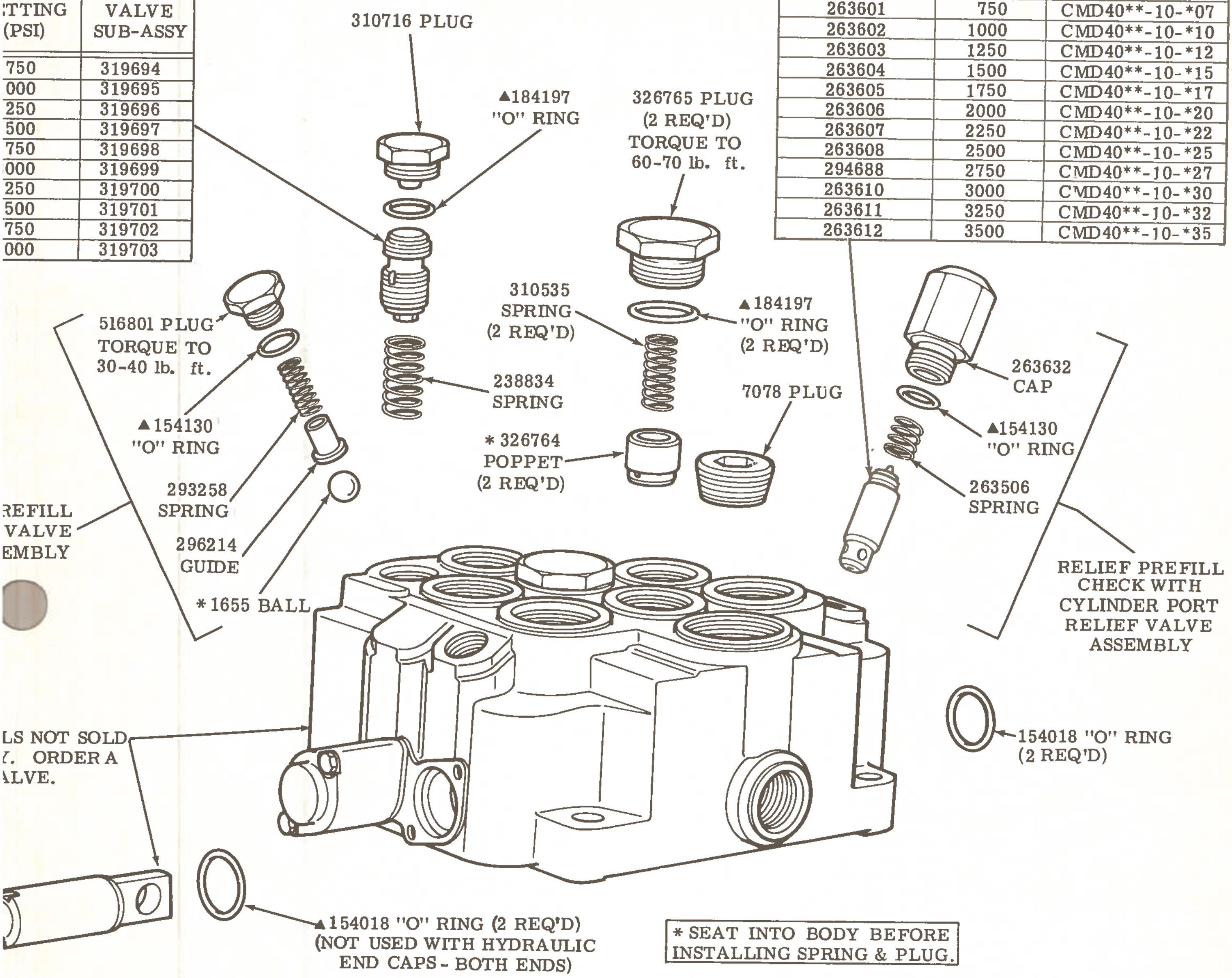
BODY
SEPA



1. Insur
2. Lubr inter
3. Shift
4. Cros
5. Chec in ar

ELIEF :TTING (PSI)	RELIEF VALVE SUB-ASSY
750	319694
000	319695
250	319696
500	319697
750	319698
000	319699
250	319700
500	319701
750	319702
000	319703

PORT RELIEF VALVE * KIT	RELIEF SETTING (PSI)	MODEL DESIGNATION
263601	750	CMD40**-10-*07
263602	1000	CMD40**-10-*10
263603	1250	CMD40**-10-*12
263604	1500	CMD40**-10-*15
263605	1750	CMD40**-10-*17
263606	2000	CMD40**-10-*20
263607	2250	CMD40**-10-*22
263608	2500	CMD40**-10-*25
294688	2750	CMD40**-10-*27
263610	3000	CMD40**-10-*30
263611	3250	CMD40**-10-*32
263612	3500	CMD40**-10-*35



AND 3 POSITION DETENT ASSEMBLY PROCEDURE

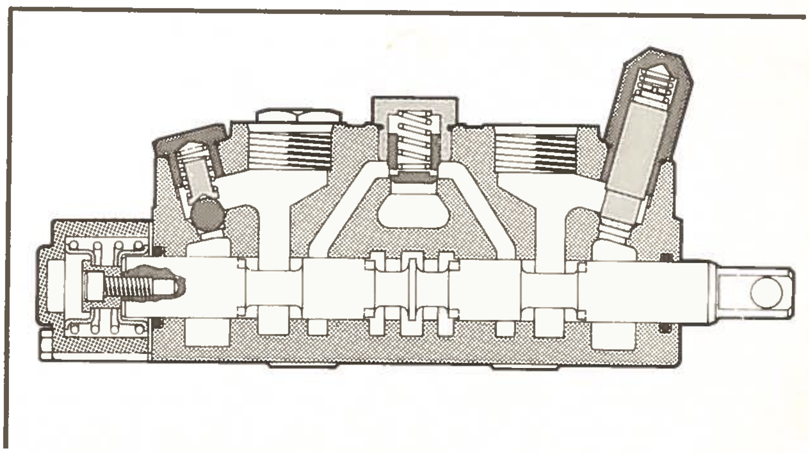
ool and detent extension are straight. Straighten if required.

parts liberally with water proof grease. Assemble cap and
. Leave mounting screw backed off approximately 2 turns.

and out to align internal parts.

mounting bolts to print requirements.

re there is no bind by rotating spool 360° and shifting spool



▲ = SERVICED IN SEAL KIT 923419

MODEL CODE BREAKDOWN

CMD 40 - ** - ** - 10 - ******

- **CMD** — MOBILE DIRECTIONAL VALVE
- **40** — VALVE CAPACITY US GPM (NOMINAL)
  - 40-40
- ****** (first) — INTEGRAL RELIEF VALVE SETTINGS (PSI)

05-500	22-2250
07-750	25-2500
10-1000	27-2750
12-1250	30-3000
15-1500	32-3250
17-1750	35-3500
20-2000	

- ****** (second) — SPOOL SECTIONS
  - D- DOUBLE ACTING
  - R- REGENERATIVE-DOUBLE ACTING-4 POSITION
  - T- SINGLE ACTING
  - W-REVERSE SINGLE ACTING
- **10** — DESIGN NUMBER
- ********** — ASSEMBLY NUMBER

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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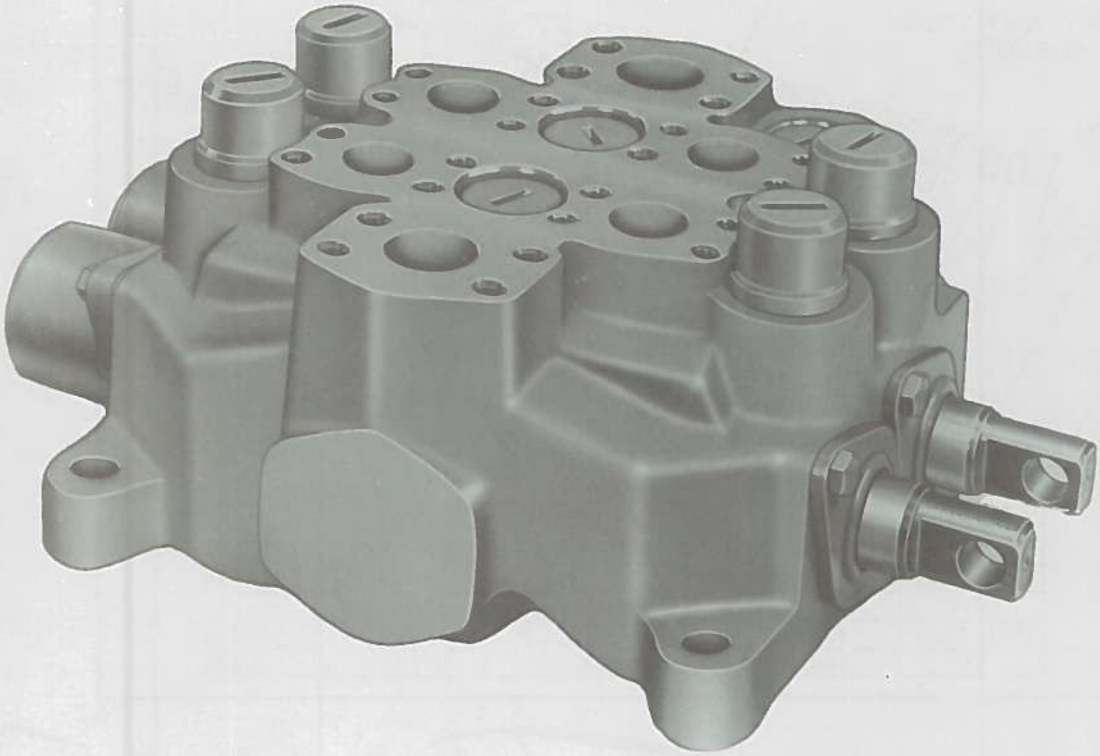
Service Parts Information

DIRECTIONAL VALVES

CMD60--***-10**



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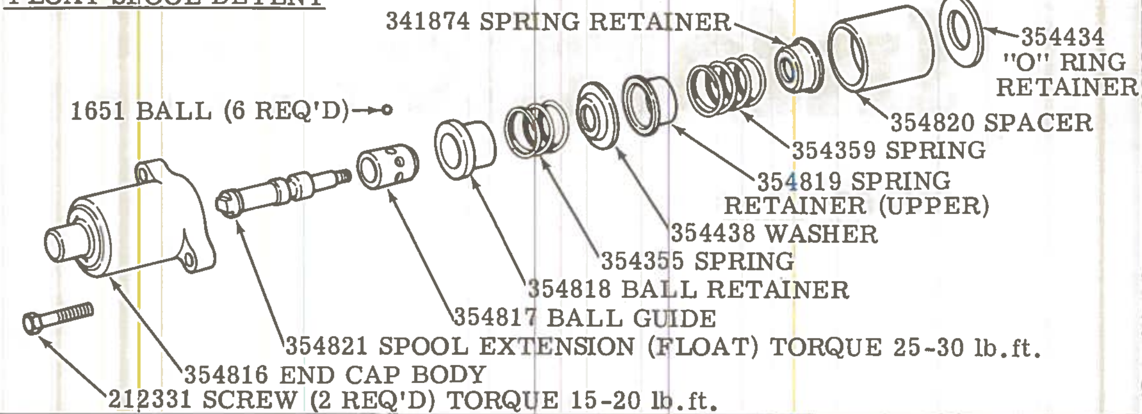
Revised 9-1-87

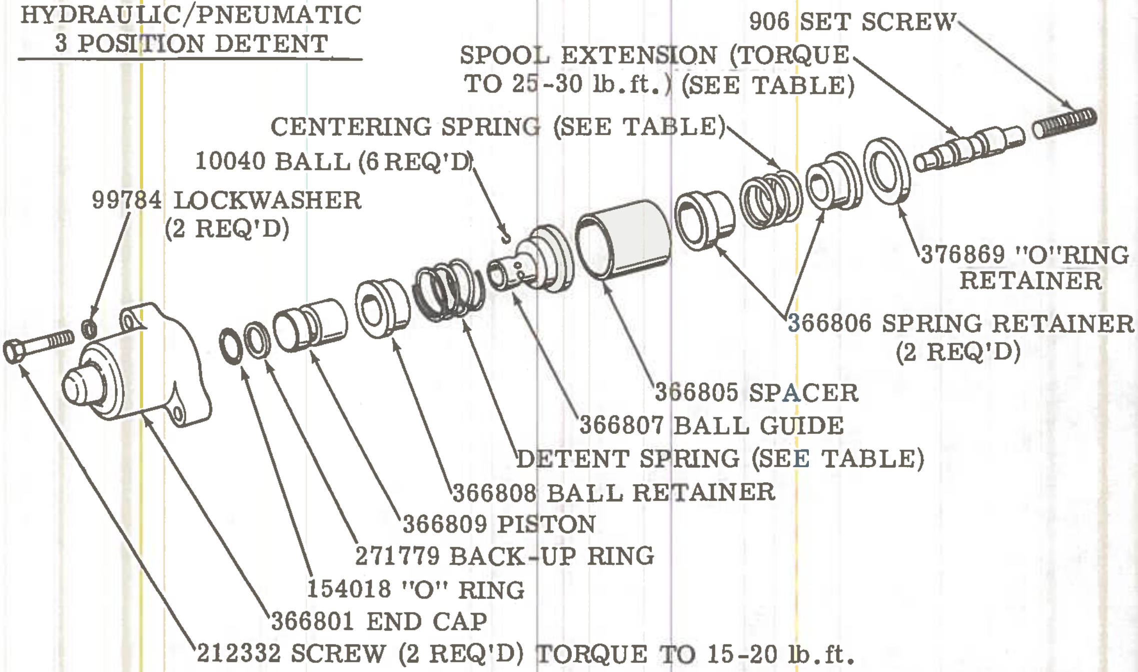
M-2422-S

WARNING: USE THIS DRAWING FOR PARTS INFORMATION ONLY. SEE OVE

FLOAT SPOOL DETENT

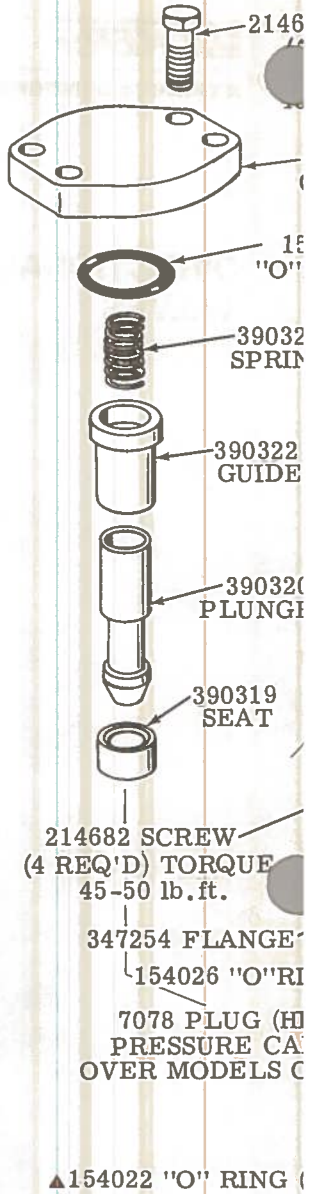


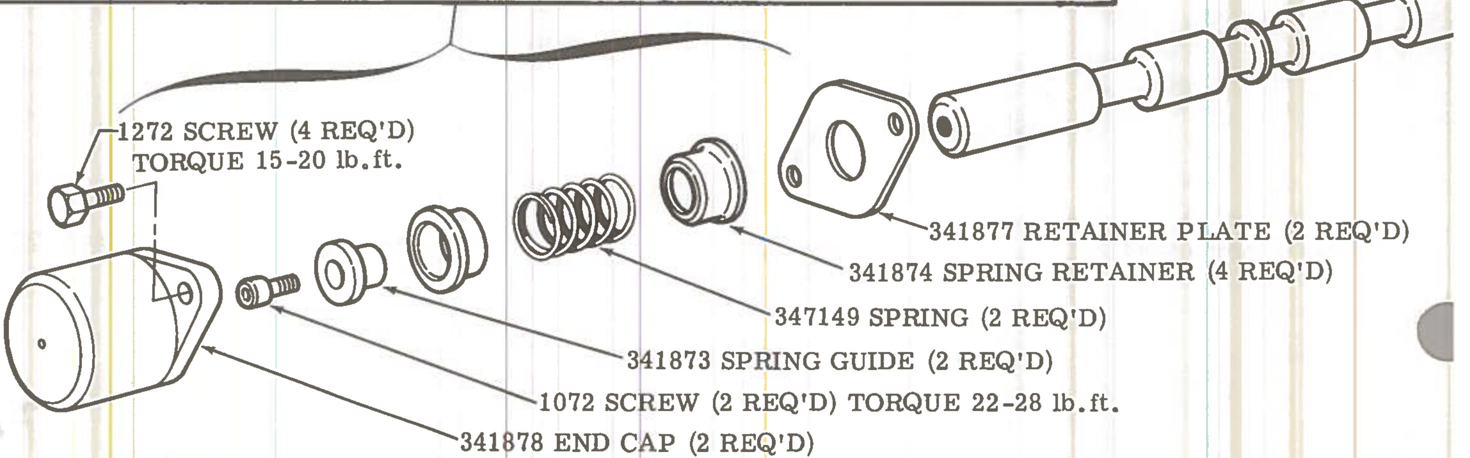
HYDRAULIC/PNEUMATIC
3 POSITION DETENT

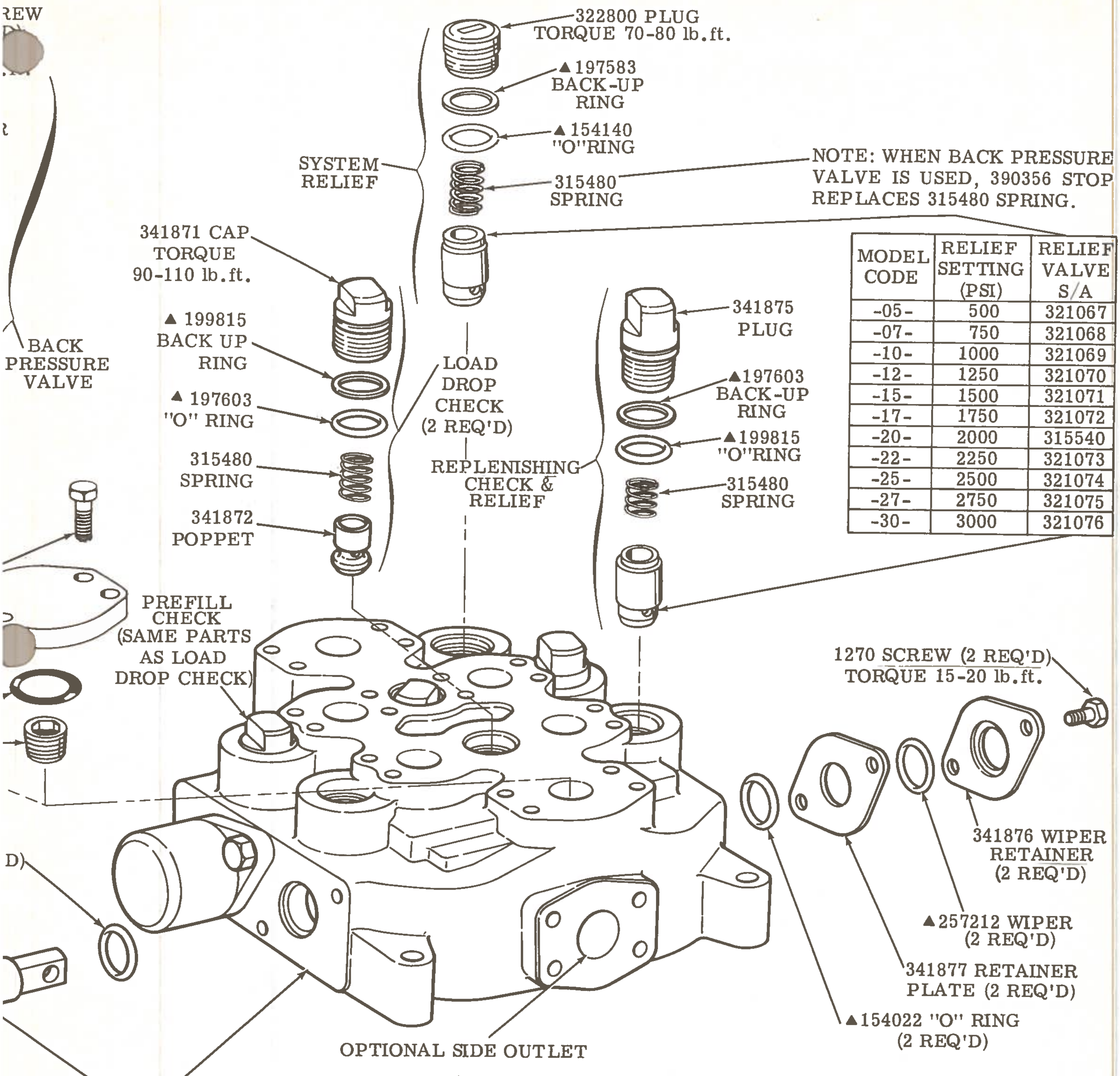


DETENT POSITION	SPOOL EXTENSION
IN & OUT	366804
OUT	393922
IN & OUT	407417
IN	409576

CENTERING SPRING RATE	CENTERING SPRING	DETENT SPRING
FULL	366760	366816
THREE QTR.	376430	376433
ONE HALF	376431	376434
ONE QTR.	376432	376435



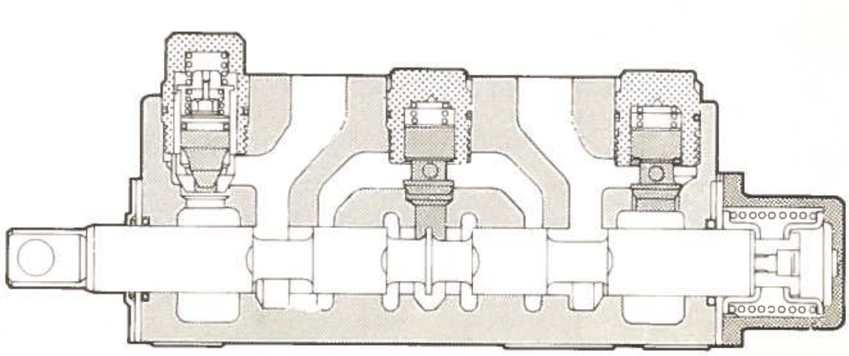




MODEL CODE	RELIEF SETTING (PSI)	RELIEF VALVE S/A
-05-	500	321067
-07-	750	321068
-10-	1000	321069
-12-	1250	321070
-15-	1500	321071
-17-	1750	321072
-20-	2000	315540
-22-	2250	321073
-25-	2500	321074
-27-	2750	321075
-30-	3000	321076

BODY AND SPOOL NOT SOLD SEPARATELY. ORDER BY MODEL NUMBER

▲INCLUDED IN SEAL KIT 923420



MODEL CODE BREAKDOWN

CMD 60 - ** - * - 10**

MOBILE
DIRECTIONAL
CONTROL

DESIGN

VALVE SERIES
NOMINAL CAPACITY
60 - 60 USGPM

SPOOL SECTIONS
B - DOUBLE ACTING MOTOR SPOOL
C - FLOAT SPOOL - 4 POSITION
D - DOUBLE ACTING
F - TRUCK SPOOL - 4 POSITION
G - REGENERATIVE FLOAT
T - SINGLE ACTING
S - SERIES - DOUBLE ACTING
W - REVERSE SINGLE ACTING

INTEGRAL RELIEF VALVE SETTING
(AVAILABLE IN INCREMENTS
OF 250 PSI FROM 750-3000 PSI)

07 - 750 PSI	20 - 2000 PSI
10 - 1000 PSI	22 - 2250 PSI
12 - 1250 PSI	25 - 2500 PSI
15 - 1500 PSI	27 - 2750 PSI
17 - 1750 PSI	30 - 3000 PSI

NOTE
CMD VALVES OFFER SO MANY OPTIONS THAT ALL VARIATIONS CANNOT BE SHOWN IN THE ABOVE MODEL CODE. THE MODEL CODE DEPICTS ONLY OPTIONS COMMON TO THE VALVE SERIES

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

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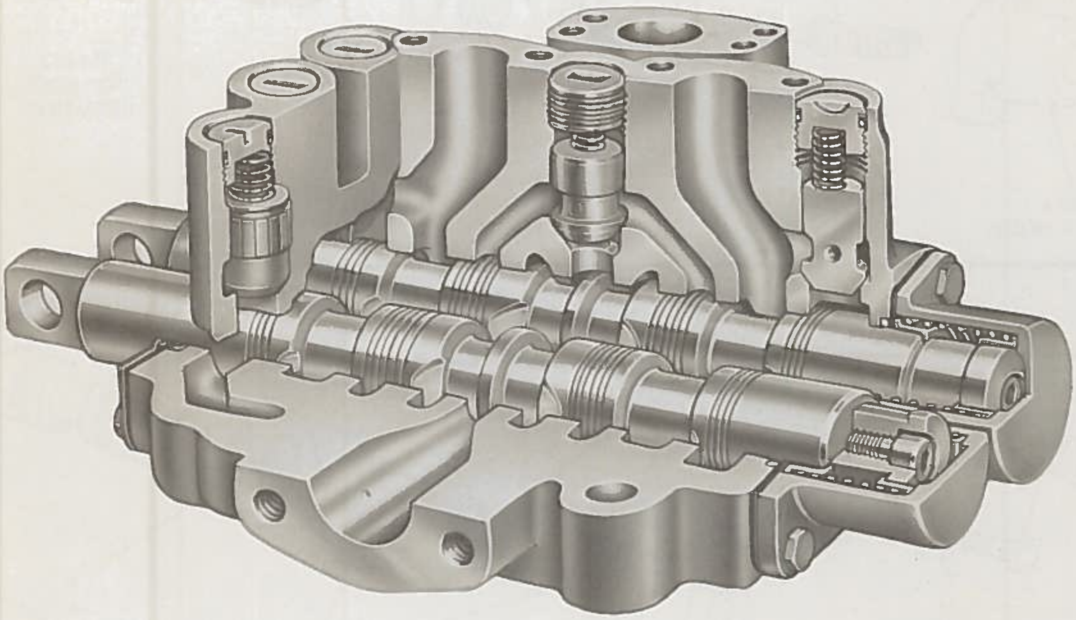
Service Parts Information

Directional Valves

CMD90 Series -10 Design



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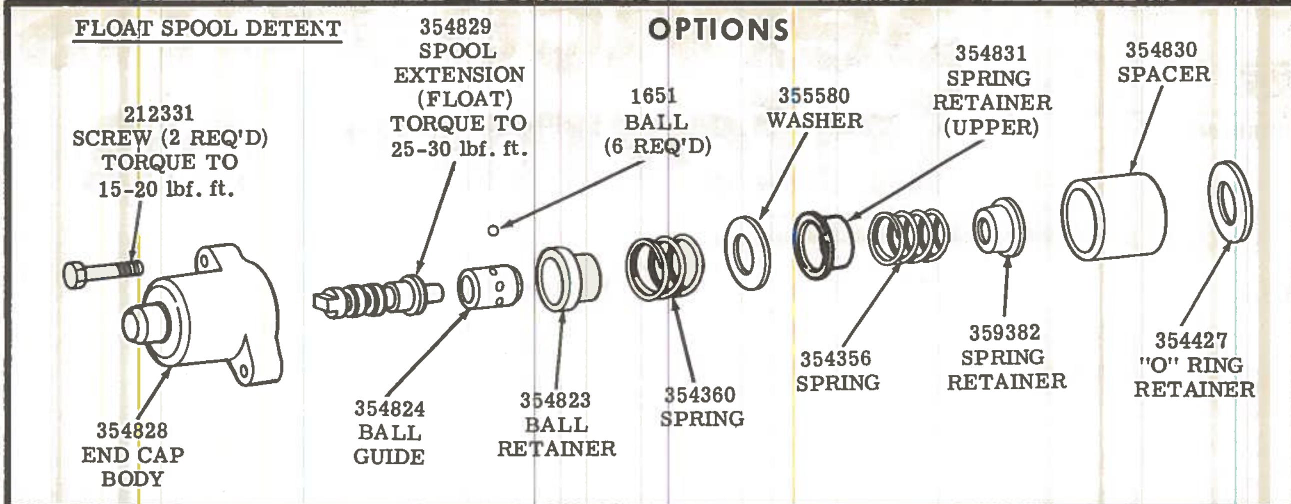
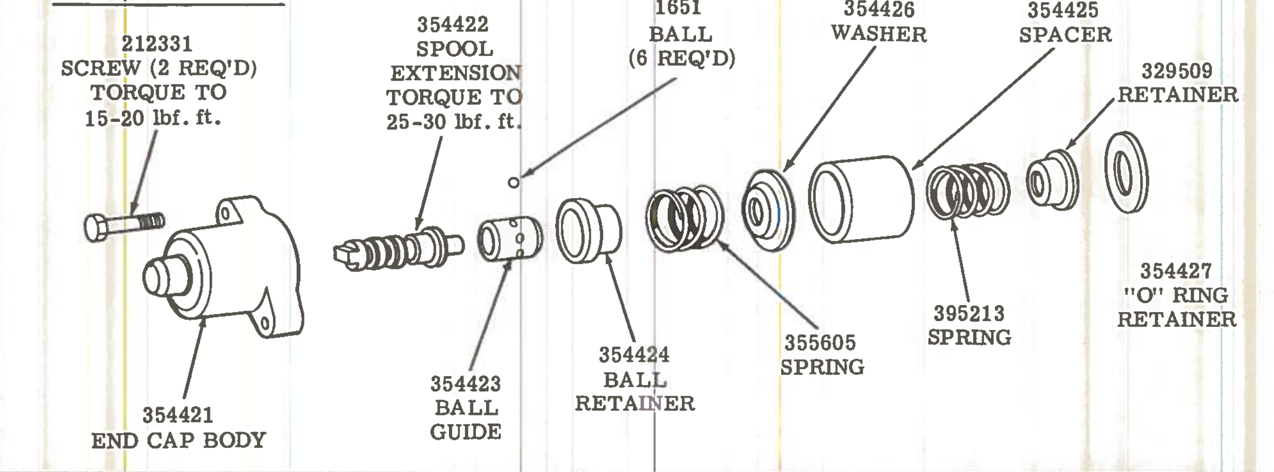
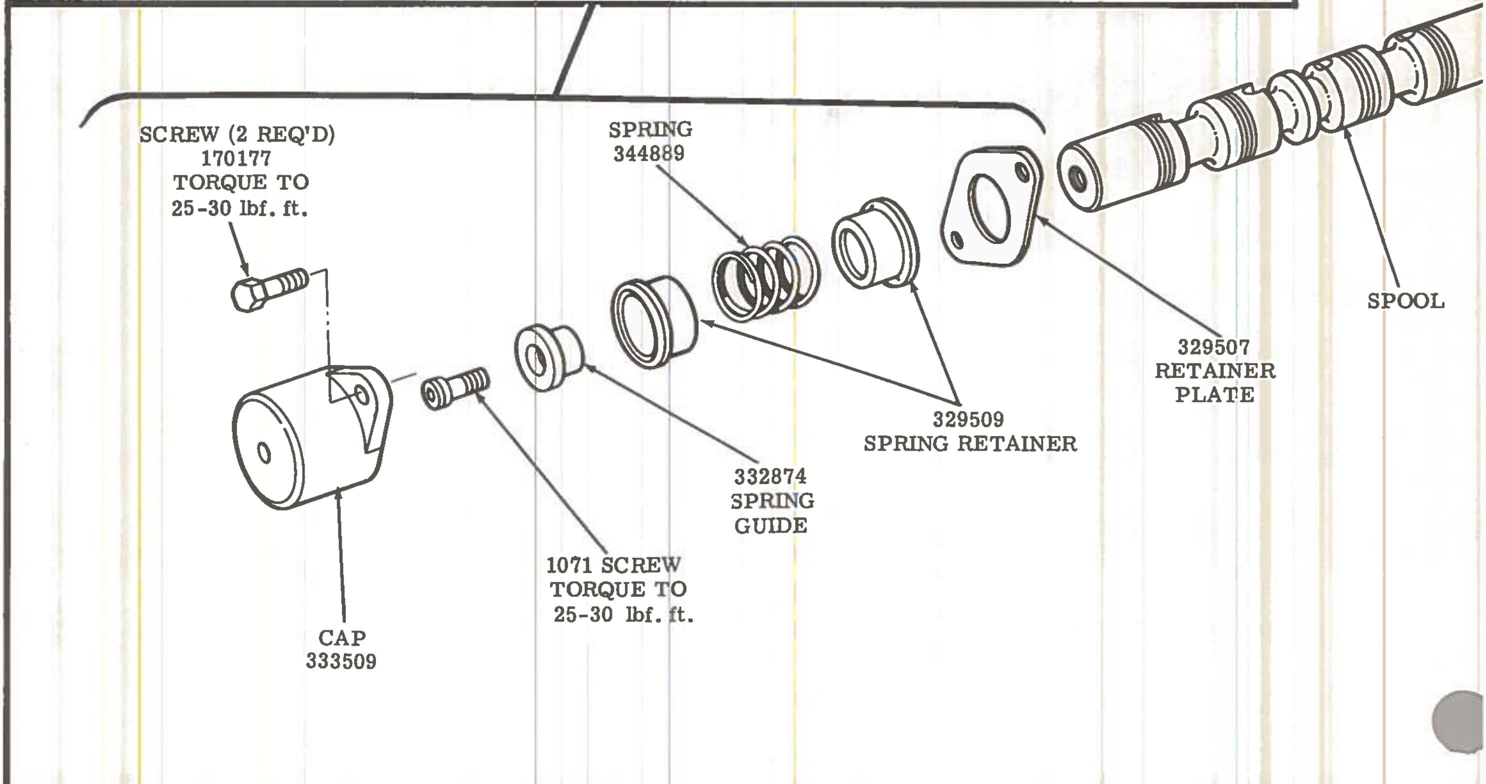
OPTIONS

FLOAT SPOOL DETENT

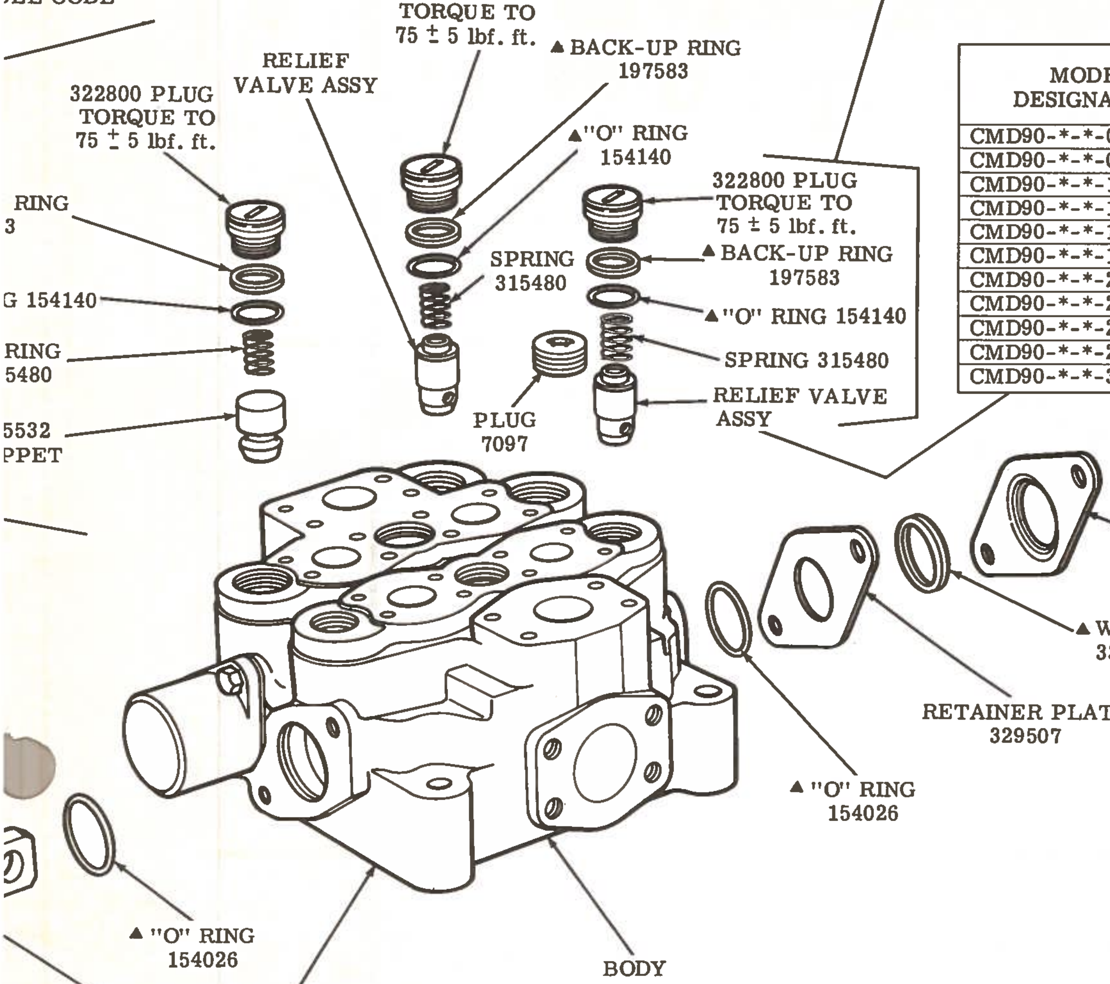


3 POSITION DETENT



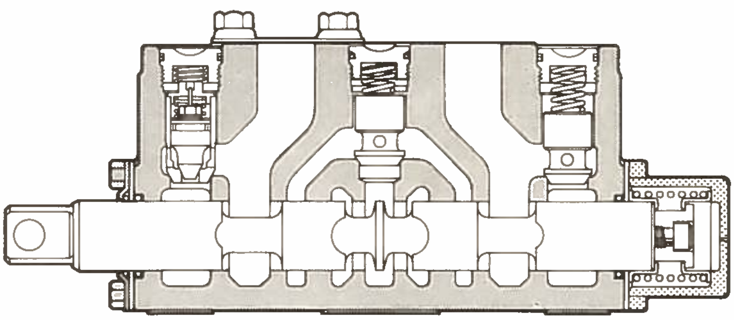


INCLUDE COMPLETE MODEL NUMBER ON ALL PARTS ORDERS



MODEL DESIGNATION	RELIEF SETTING (PSI)	RELIEF VALVE SUB-ASSY
CMD90-*-*-05-*-*-10	500	321067
CMD90-*-*-07-*-*-10	750	321068
CMD90-*-*-10-*-*-10	1000	321069
CMD90-*-*-12-*-*-10	1250	321070
CMD90-*-*-15-*-*-10	1500	321071
CMD90-*-*-17-*-*-10	1750	321072
CMD90-*-*-20-*-*-10	2000	315540
CMD90-*-*-22-*-*-10	2250	321073
CMD90-*-*-25-*-*-10	2500	321074
CMD90-*-*-27-*-*-10	2750	321075
CMD90-*-*-30-*-*-10	3000	321076

▲ SERVICED IN SEAL KIT 923421



ASSEMBLY VIEW

MODEL CODE BREAKDOWN

CMD 90 - 30 - DDD - 10 - ******

MOBILE DIRECTIONAL CONTROL

VALVE SERIES
(NOMINAL CAPACITY-US GPM)
90-90

INTEGRAL RELIEF VALVE SETTINGS
(AVAILABLE IN INCREMENTS OF 250 PSI
FROM 750 - 3000 PSI

07-750 PSI	20-2000 PSI
10-1000 PSI	22-2250 PSI
12-1250 PSI	25-2500 PSI
15-1500 PSI	27-2750 PSI
17-1750 PSI	30-3000 PSI

SPOOL SECTIONS
D- DOUBLE ACTING
T- SINGLE ACTING
W-REVERSE SINGLE ACTING
B- DOUBLE ACTING MOTOR SPOOL
C- FLOAT SPOOL - 4 POSITION
S- SERIES, DOUBLE ACTING
F-TRUCK SPOOL - 4 POSITION
G- REGENERATIVE FLOAT
R- REGENERATIVE, DOUBLE ACTING 4 POSITION

DESIGN NUMBERS

ASSEMBLY NUMBER

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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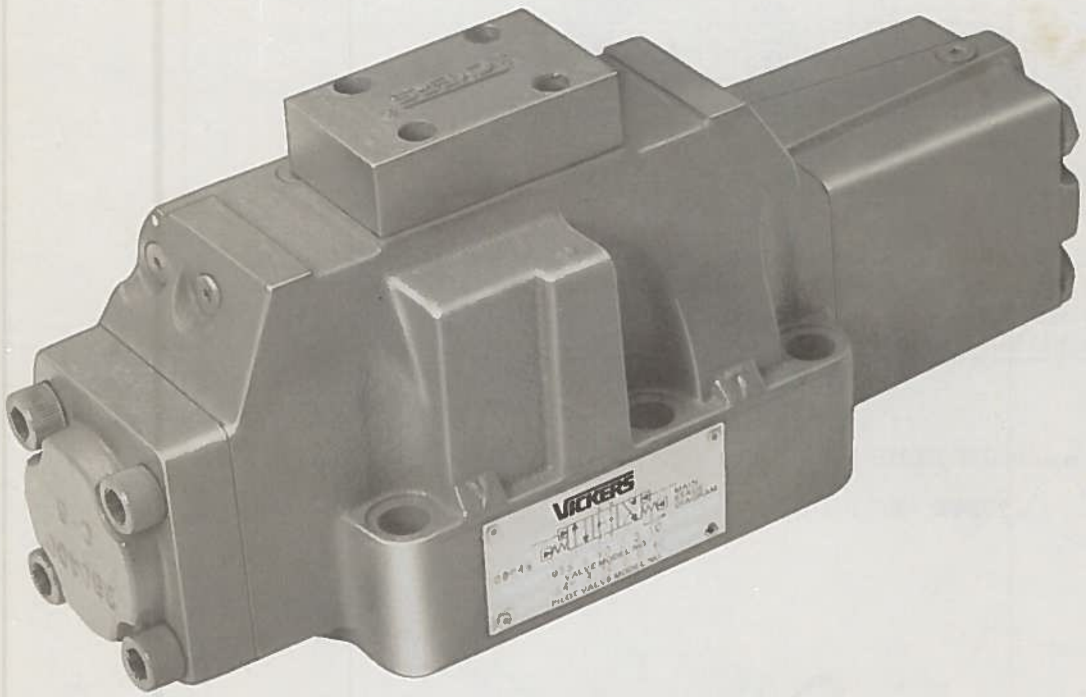
Service Parts Information

Pressure Centered Pilot Operated Directional Control Valves

DG3S-8-*D-*-*-10



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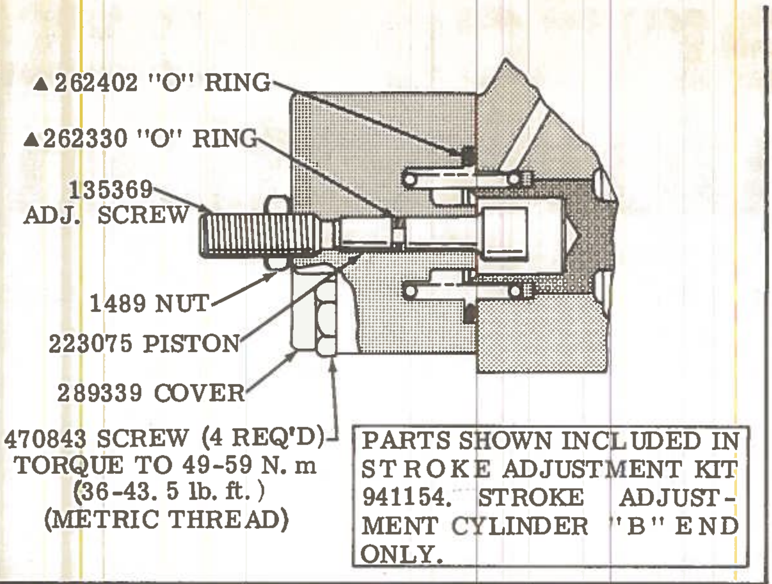


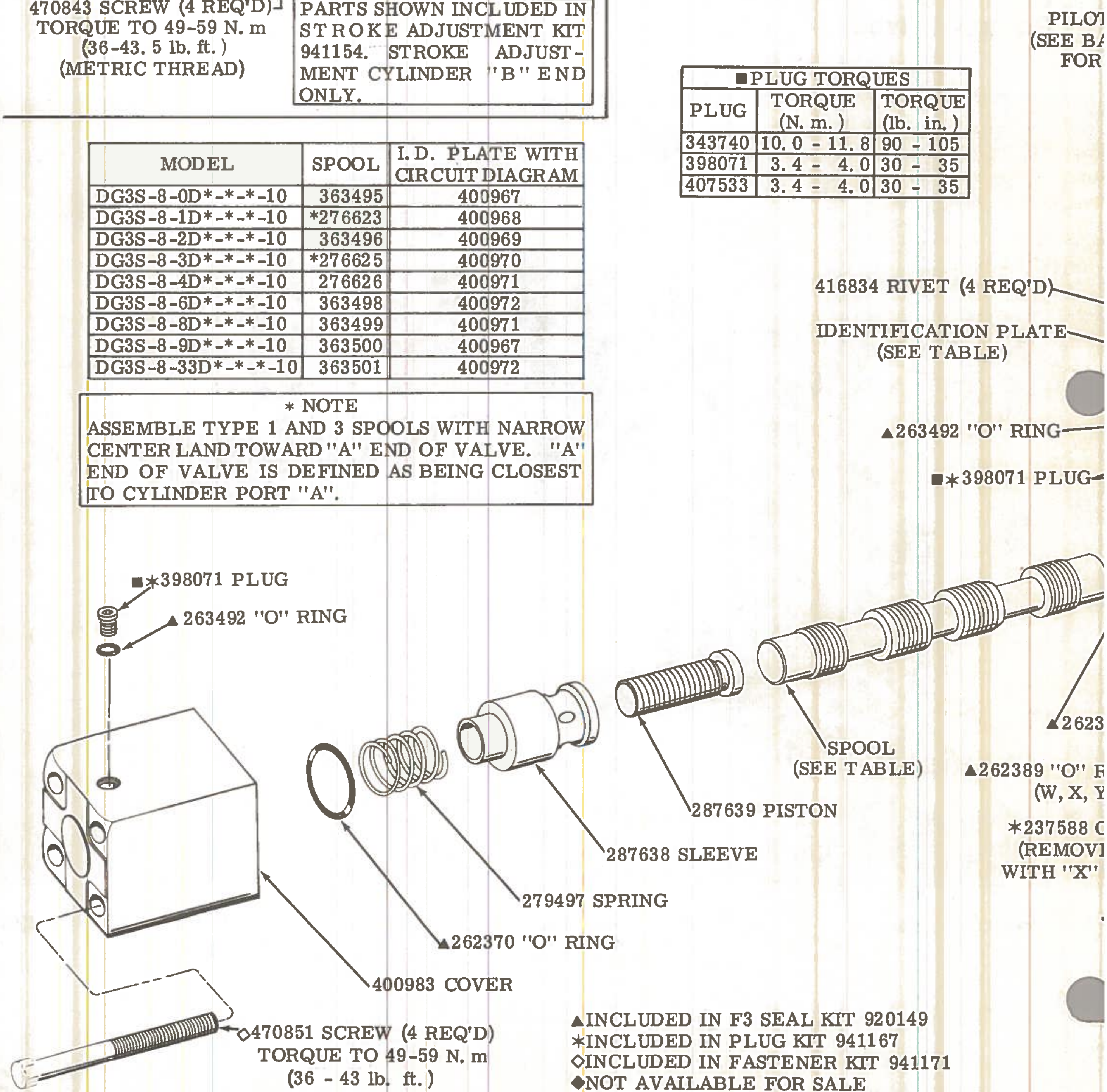
PARTS SHOWN INCLUDED IN STROKE ADJUSTMENT KIT 941154. STROKE ADJUSTMENT CYLINDER "B" END ONLY.

COVER ATTACHING BOLTS	
MODEL	BOLT KIT
W/OUT PILOT CHOKE	466834
W/PILOT CHOKE	466836
TORQUE TO 4. 5 - 5. 7 N. m (39. 8 - 50. 4 lb. in.)	
BOLT KITS INCLUDE 4 SCREWS	

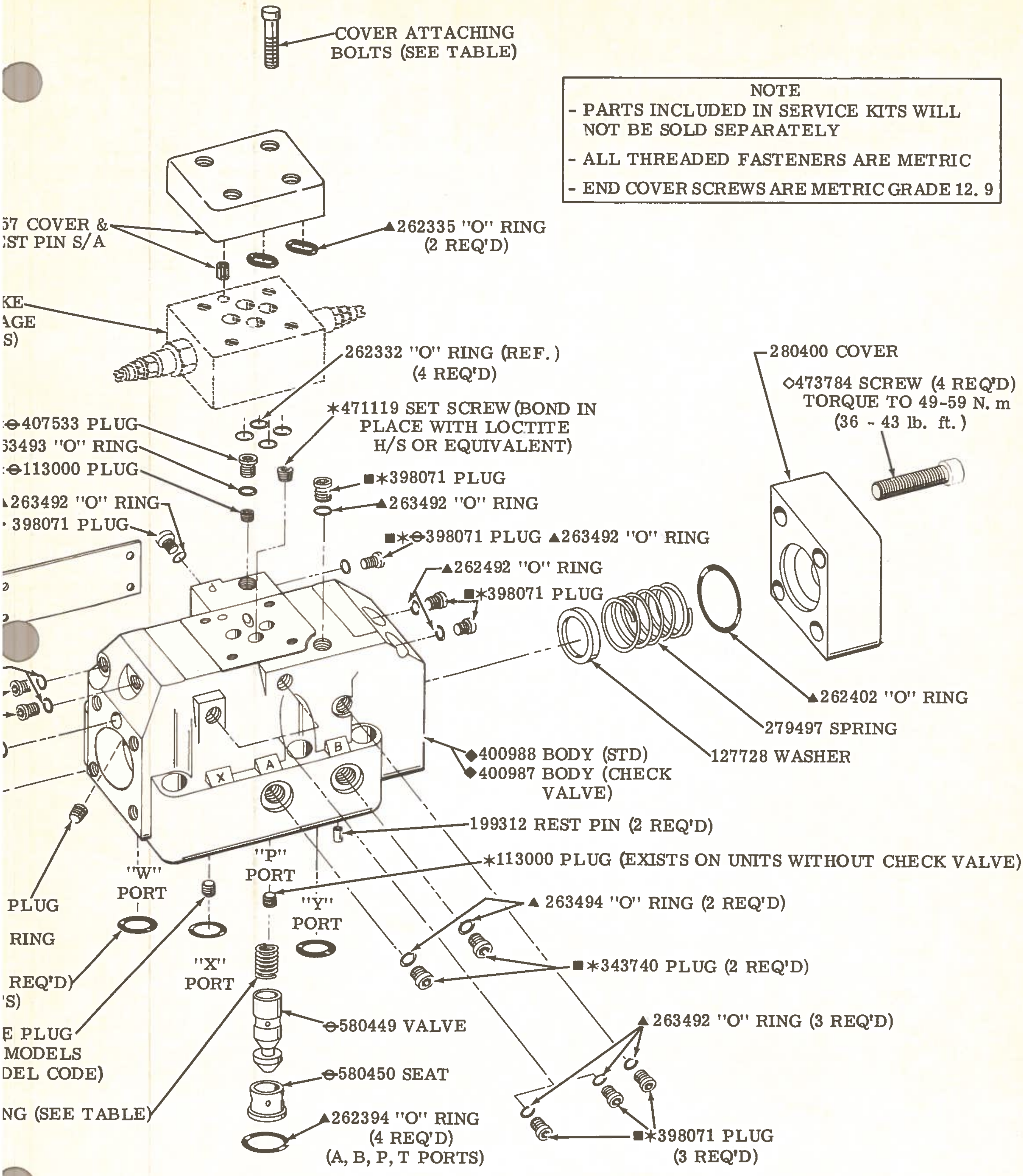
MODEL	SPOOL	I.D. PLATE WITH CIRCUIT DIAGRAM
DG3S-8-0D*-*-*-10	363495	400967
DG3S-8-1D*-*-*-10	*276623	400968
DG3S-8-2D*-*-*-10	363496	400969
DG3S-8-3D*-*-*-10	*276625	400970
DG3S-8-4D*-*-*-10	276626	400971
DG3S-8-6D*-*-*-10	363498	400972
DG3S-8-8D*-*-*-10	363499	400971
DG3S-8-9D*-*-*-10	363500	400967
DG3S-8-33D*-*-*-10	363501	400972

■PLUG TORQUES		
PLUG	TORQUE (N. m.)	TORQUE (lb. in.)
343740	10. 0 - 11. 8	90 - 105
398071	3. 4 - 4. 0	30 - 35
407533	3. 4 - 4. 0	30 - 35

* NOTE
ASSEMBLE TYPE 1 AND 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END OF VALVE IS DEFINED AS BEING CLOSEST TO CYLINDER PORT "A".



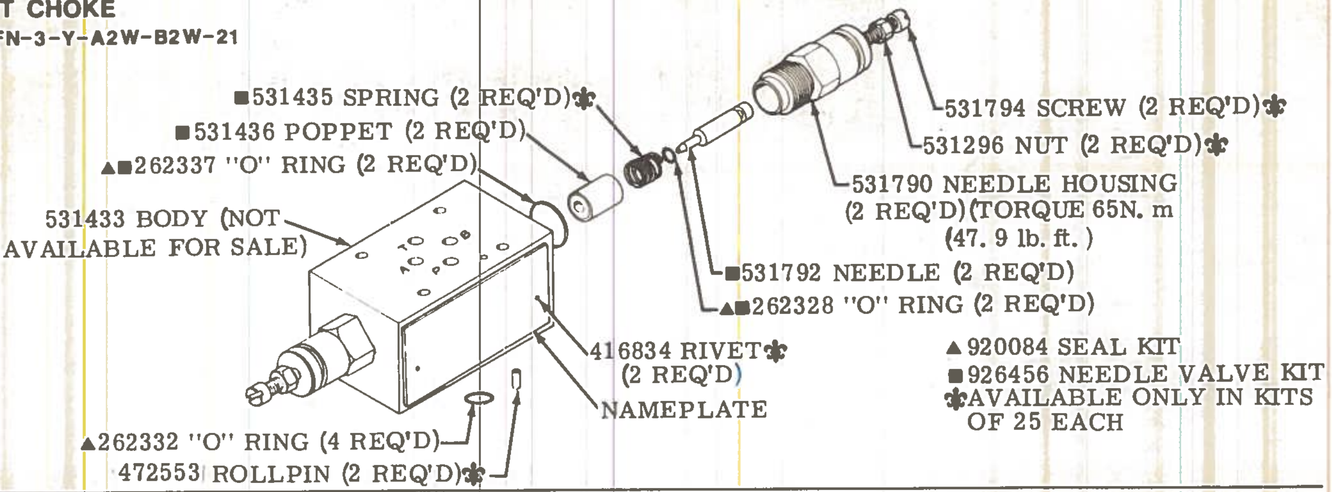
▲INCLUDED IN F3 SEAL KIT 920149
∗INCLUDED IN PLUG KIT 941167
◇INCLUDED IN FASTENER KIT 941171
◆NOT AVAILABLE FOR SALE
⊖USED ON CHECK VALVE MODELS ONLY



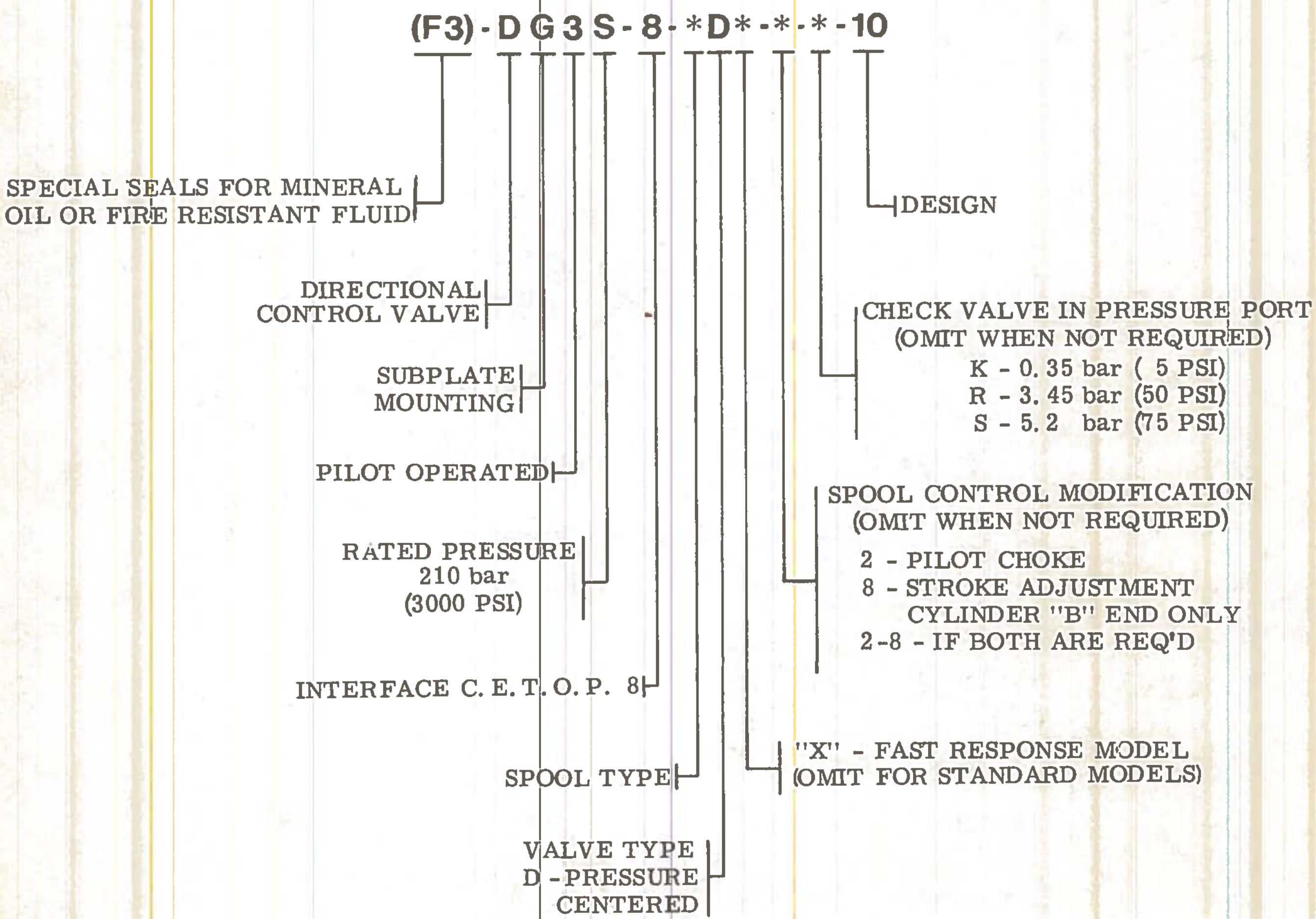
NOTE
- PARTS INCLUDED IN SERVICE KITS WILL NOT BE SOLD SEPARATELY
- ALL THREADED FASTENERS ARE METRIC
- END COVER SCREWS ARE METRIC GRADE 12. 9

MODEL	⊖SPRING	COLOR
DG3S-8-*D*-*-K-10	398130	———
DG3S-8-*D*-*-R-10	398131	YELLOW
DG3S-8-*D*-*-S -10	398132	RED

PILOT CHOKE
DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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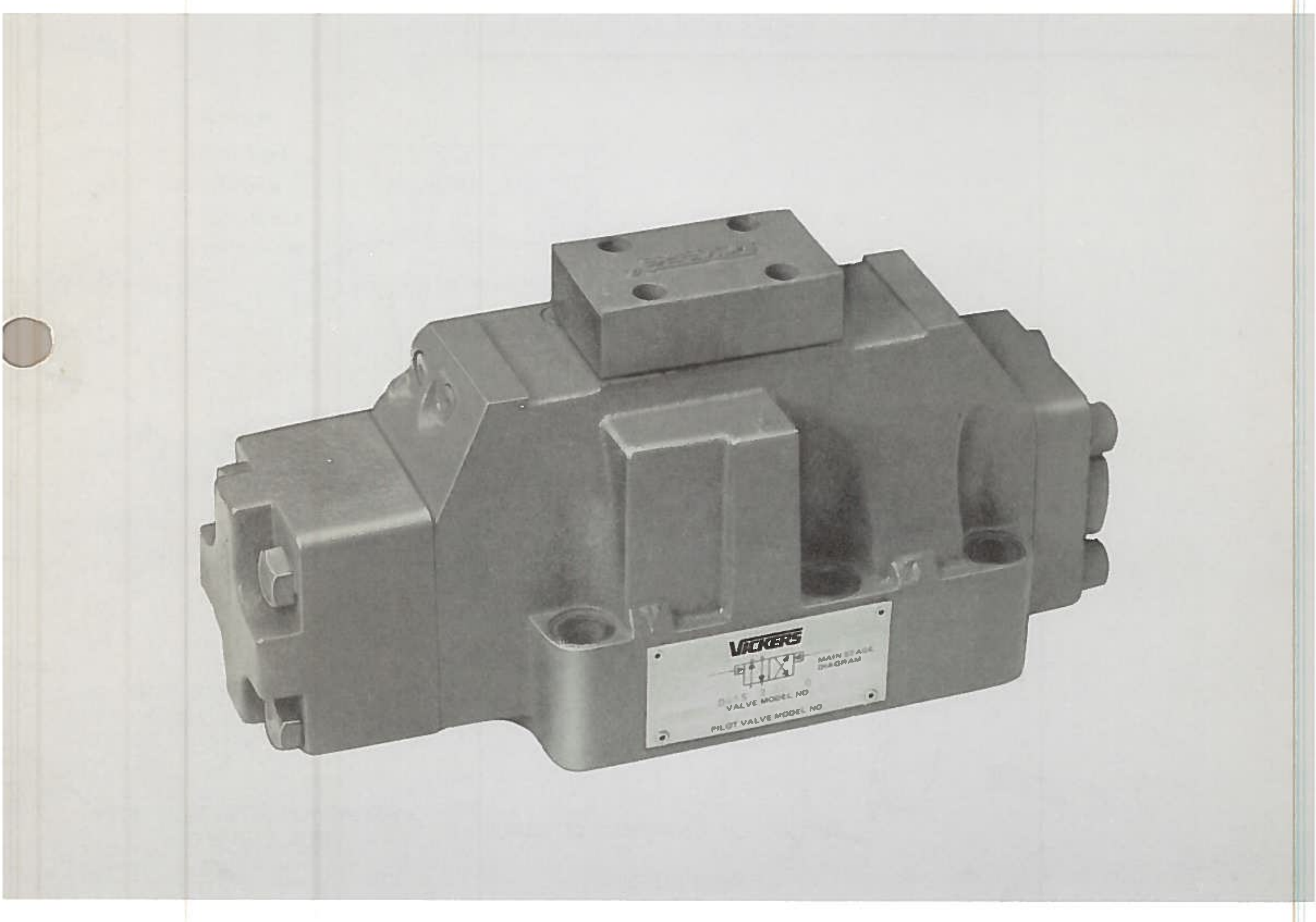
Service Parts Information

Pilot Operated Directional Control Valves

DG3S-8-*A*-*-*-10



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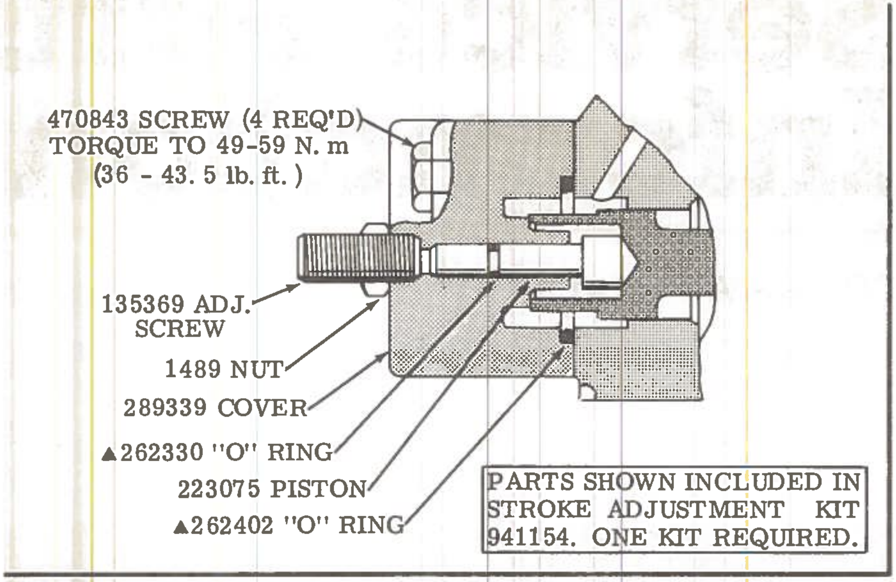
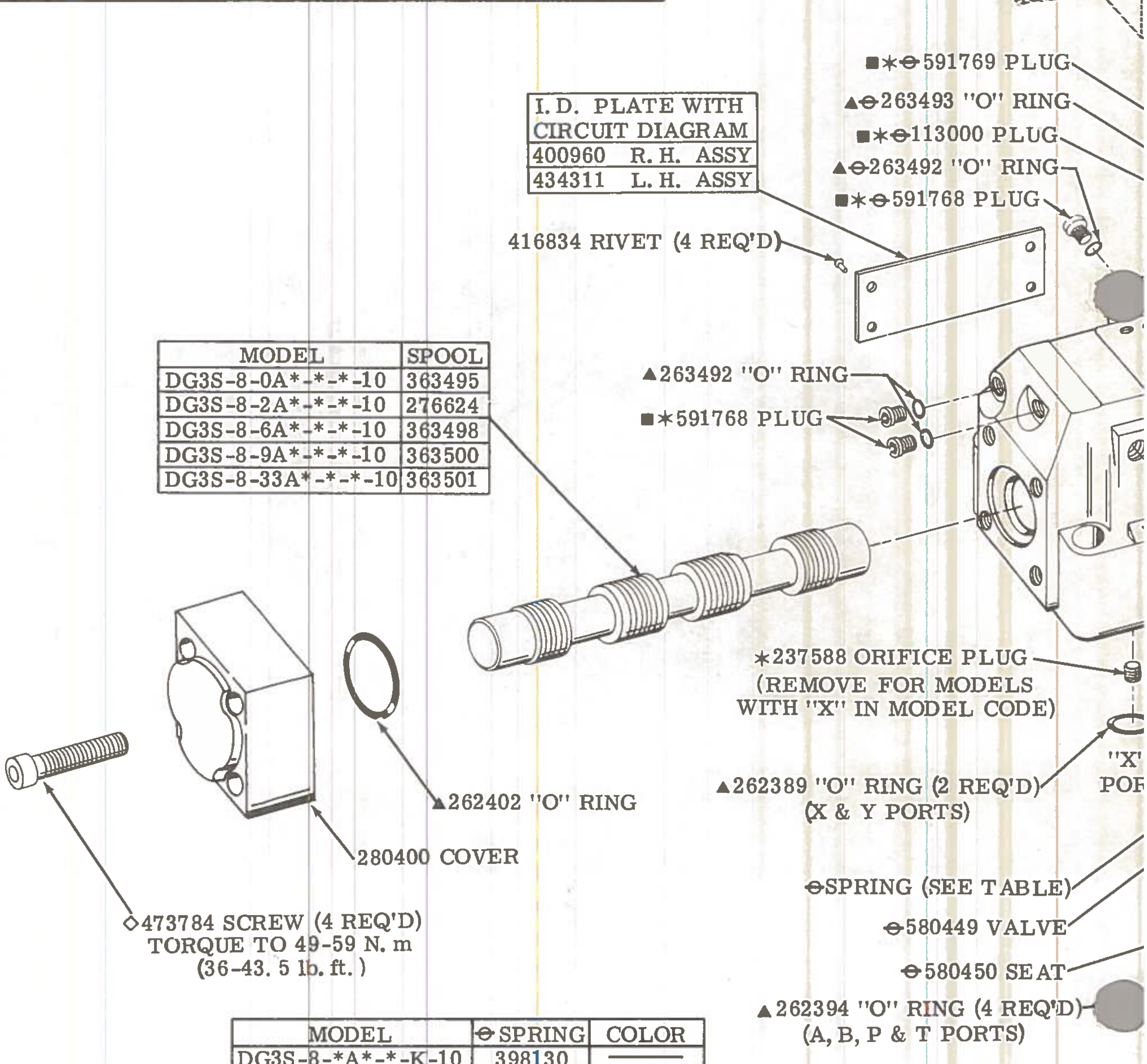
77



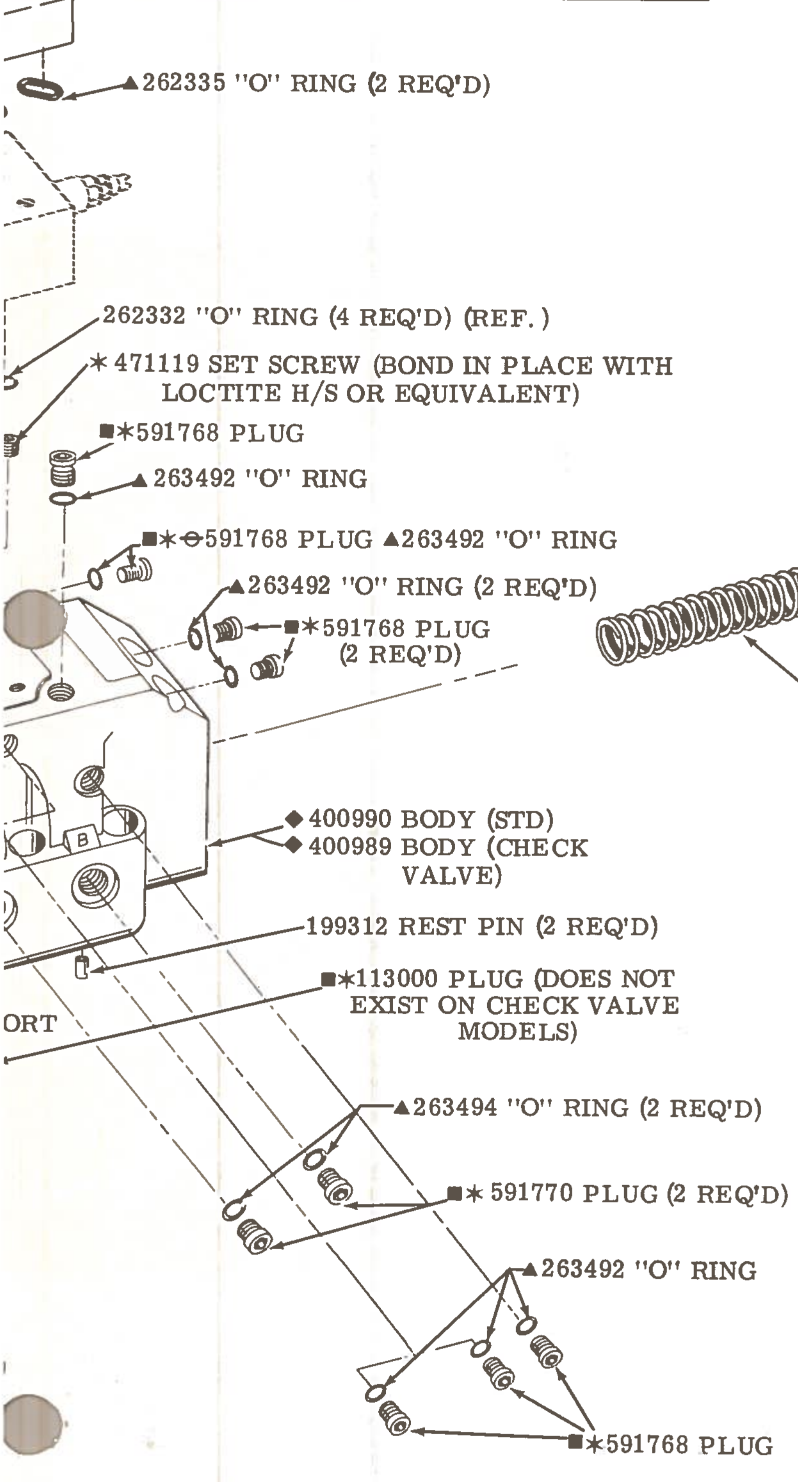


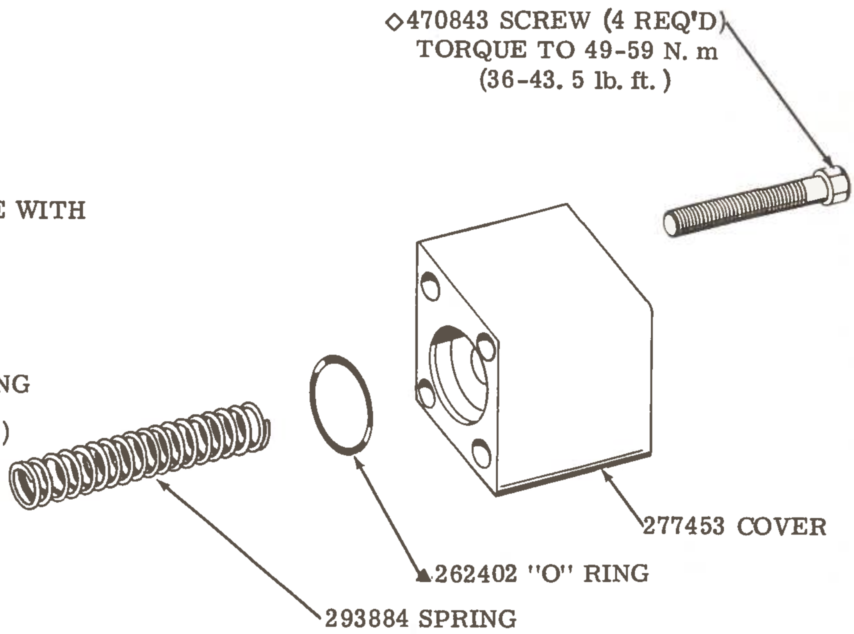
MODEL	SPOOL
DG3S-8-0A*-*-*-10	363495
DG3S-8-2A*-*-*-10	276624
DG3S-8-6A*-*-*-10	363498
DG3S-8-9A*-*-*-10	363500
DG3S-8-33A*-*-*-10	363501

MODEL	⊖SPRING	COLOR
DG3S-8-*A*-*-K-10	398130	———
DG3S-8-*A*-*-R-10	398131	YELLOW
DG3S-8-*A*-*-S-10	398132	RED

COVER ATTACHING SCREWS		
MODEL	□SCREW (4 REQ'D)	BOLT KIT
W/OUT PILOT CHOKE	473726	———
WITH PILOT CHOKE	———	466836
TORQUE 4. 5-5. 7 N. m(39. 8 - 50. 4 lb. in.)		

NOTE
- PARTS INCLUDED IN SERVICE KITS WILL NOT BE SOLD SEPARATELY
- ALL THREADED FASTENERS ARE METRIC
- END COVER SCREWS ARE METRIC GRADE 12. 9





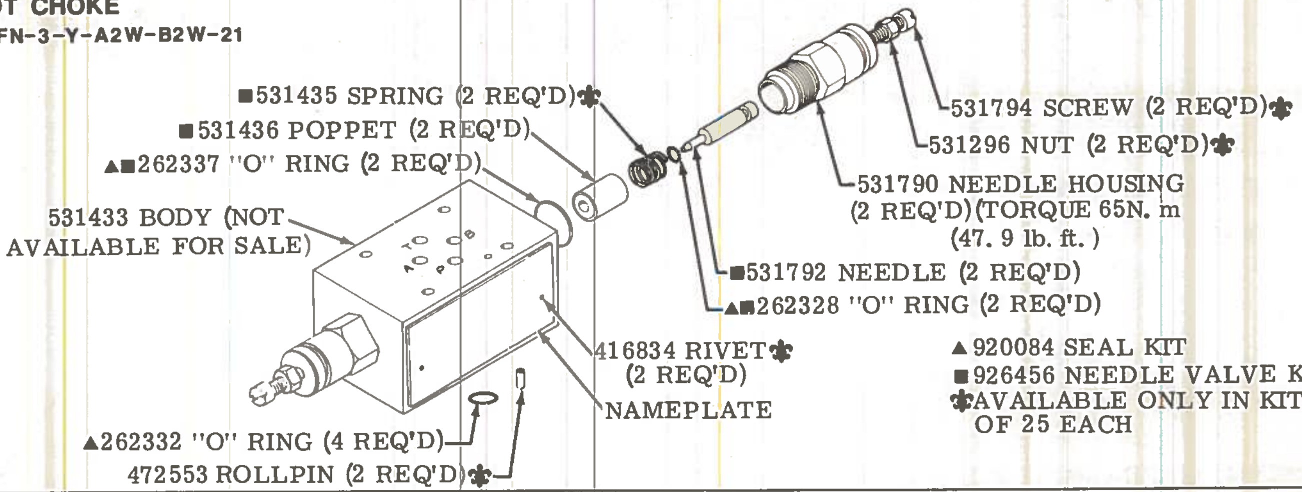
NOTE
RIGHT HAND ASSEMBLY SHOWN. FOR LEFT HAND ASSEMBLY, COVERS AND SPRING ARE REVERSED AND I. D . PLATE IS CHANGED.

□INCLUDED IN FASTENER KIT 941164
◇INCLUDED IN FASTENER KIT 941170
✱INCLUDED IN PLUG KIT 941167
◆NOT AVAILABLE FOR SALE
⊖USED ON CHECK VALVE MODELS ONLY

▲SERVICE ALL UNITS W/F3 SEAL KIT 920149

■ PLUG	TORQUE (N. m)	TORQUE (lb. in.)
113000	5.0-5. 9	45-52
591768	9.8-10.2	87-90
591769	12.1-12.4	107-110
591770	15.0-16.6	133-147

PILOT CHOKE
DGMFN-3-Y-A2W-B2W-21



▲920084 SEAL KIT
■926456 NEEDLE VALVE KIT
✤AVAILABLE ONLY IN KITS OF 25 EACH

MODEL CODE BREAKDOWN

(F3)-DG3S-8-*A*-*-*-10(LH)

- (F3) — SPECIAL SEALS FOR MINERAL OIL OR FIRE RESISTANT FLUID
- D — DIRECTIONAL CONTROL VALVE
- G — SUBPLATE MOUNTING
- 3 — PILOT OPERATED
- S — RATED PRESSURE 210 bar (3000 PSI)
- 8 — INTERFACE C. E. T. O. P. 8
- * — SPOOL TYPES
- A — SPRING OFFSET
- * — "X" - FAST RESPONSE (OMIT FOR STANDARD MODELS)
- * — SPOOL CONTROL MODIFICATION (OMIT WHEN NOT REQ'D)
  - 2 - PILOT CHOKE ADJUSTMENTS
  - 7 - STROKE ADJUSTMENT CYLINDER "A" END ONLY (R. H.)
  - 8 - STROKE ADJUSTMENT CYLINDER "B" END ONLY (L. H.)
  - 2-7 IF BOTH ARE REQUIRED
  - 2-8 IF BOTH ARE REQUIRED
- * — CHECK VALVE IN PRESSURE PORT (OMIT WHEN NOT REQ'D)
  - K - 0. 35 bar, (5 PSI)
  - R - 3. 45 bar, (50 PSI)
  - S - 5. 20 bar, (75 PSI)
- 10 — DESIGN
- (LH) — L. H. ASSEMBLY OFFSET TO "B" (OMIT FOR R. H. ASSEMBLY OFFSET TO "A")

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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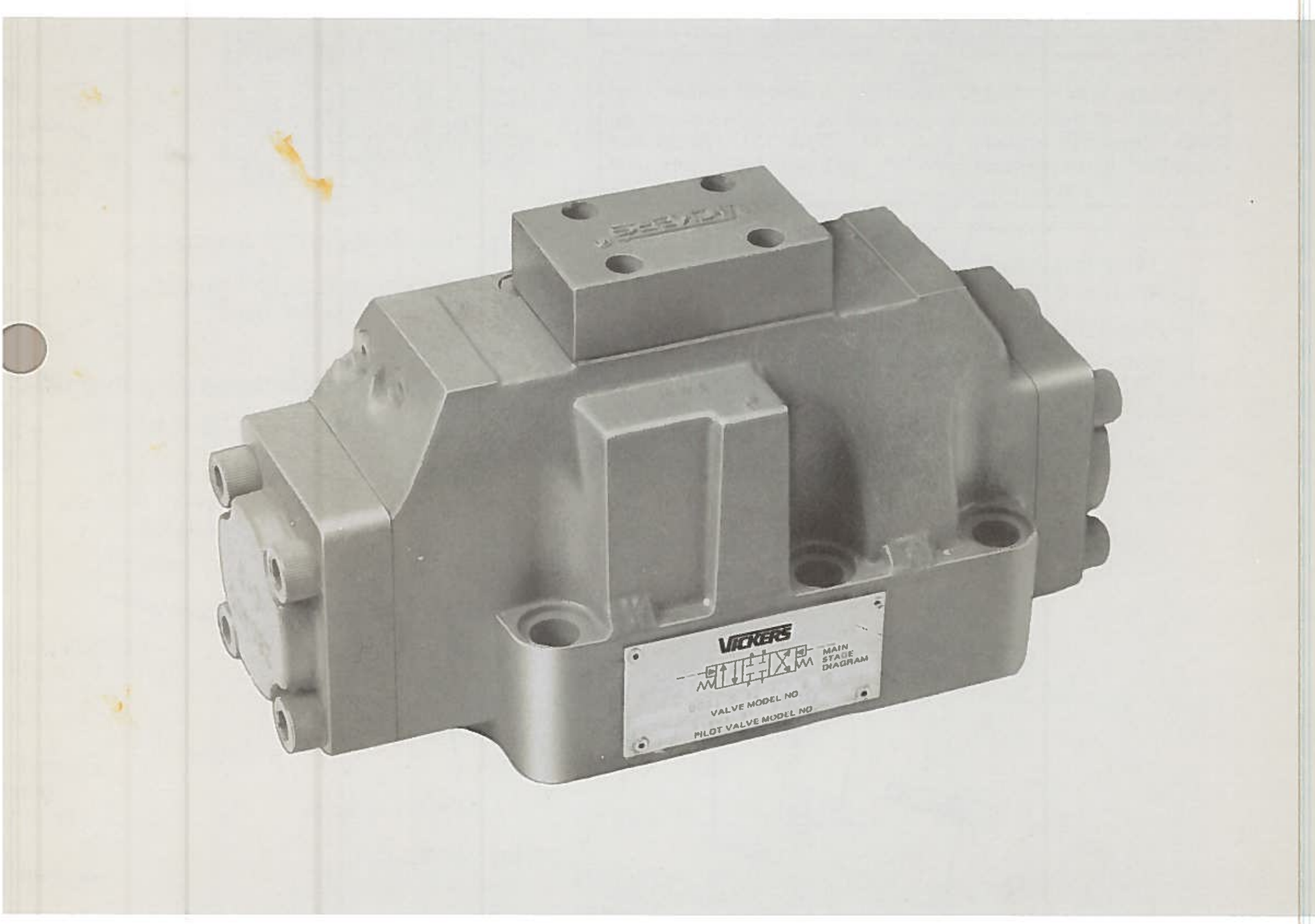
Service Parts Information

Pilot Operated Directional Control Valves

(F3)-DG3S-8-*C*-*-*-10 Spring Centered
(F3)-DG3S-8-***-*-*-10 No Spring



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COVER ATTACHING SCREWS		
MODEL	FASTENER KIT	BOLT KIT
WITHOUT PILOT CHOKE	□ 941164	———
WITH PILOT CHOKE	———	466836
KITS INCLUDE (4) SCREWS		
TORQUE TO 4. 5 - 5. 7 N. m (39. 8-50. 4 lb. in.)		

MODEL	SPOOL	I. D. PLATE WITH CIRCUIT DIAGRAM	
		SPRING CTR	NO-SPRING
DG3S-8-0(C)*-*-*-10	363495	400976	400975
DG3S-8-1 C *-*-*-10	* 276623	400977	———
DG3S-8-2(C)*-*-*-10	363496	400978	400975
DG3S-8-3 C *-*-*-10	* 276625	400979	———
DG3S-8-4 C *-*-*-10	276626	400980	
DG3S-8-6(C)*-*-*-10	363498	400981	400975
DG3S-8-8 C *-*-*-10	363499	400980	———
DG3S-8-9(C)*-*-*-10	363500	400976	400975
DG3S-8-31 C *-*-*-10	* 276625	580475	———
DG3S-8-33 C *-*-*-10	363501	400981	

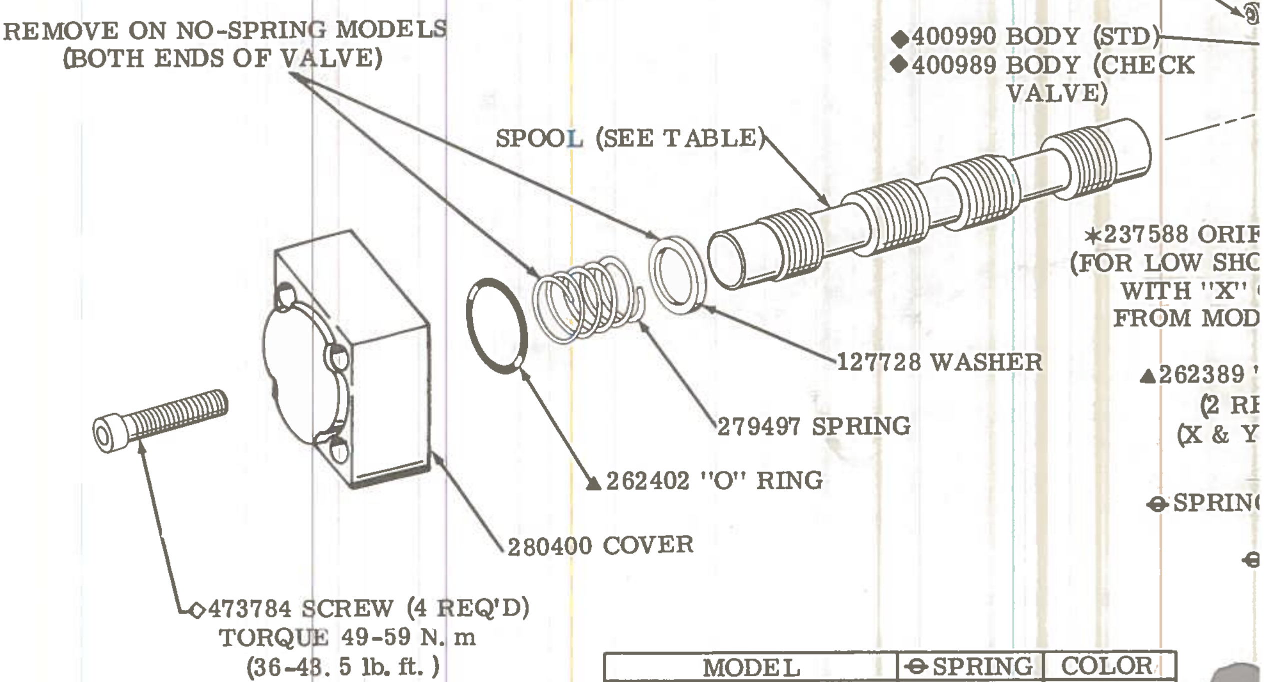
*NOTE

Assemble type '1' and '3' spools with narrow center land towards "A" end of valve. "A" end of valve is defined as being closest to cylinder port "A". Type '31' spools are installed in reverse of type '3', with narrow center land toward "B" end of valve.

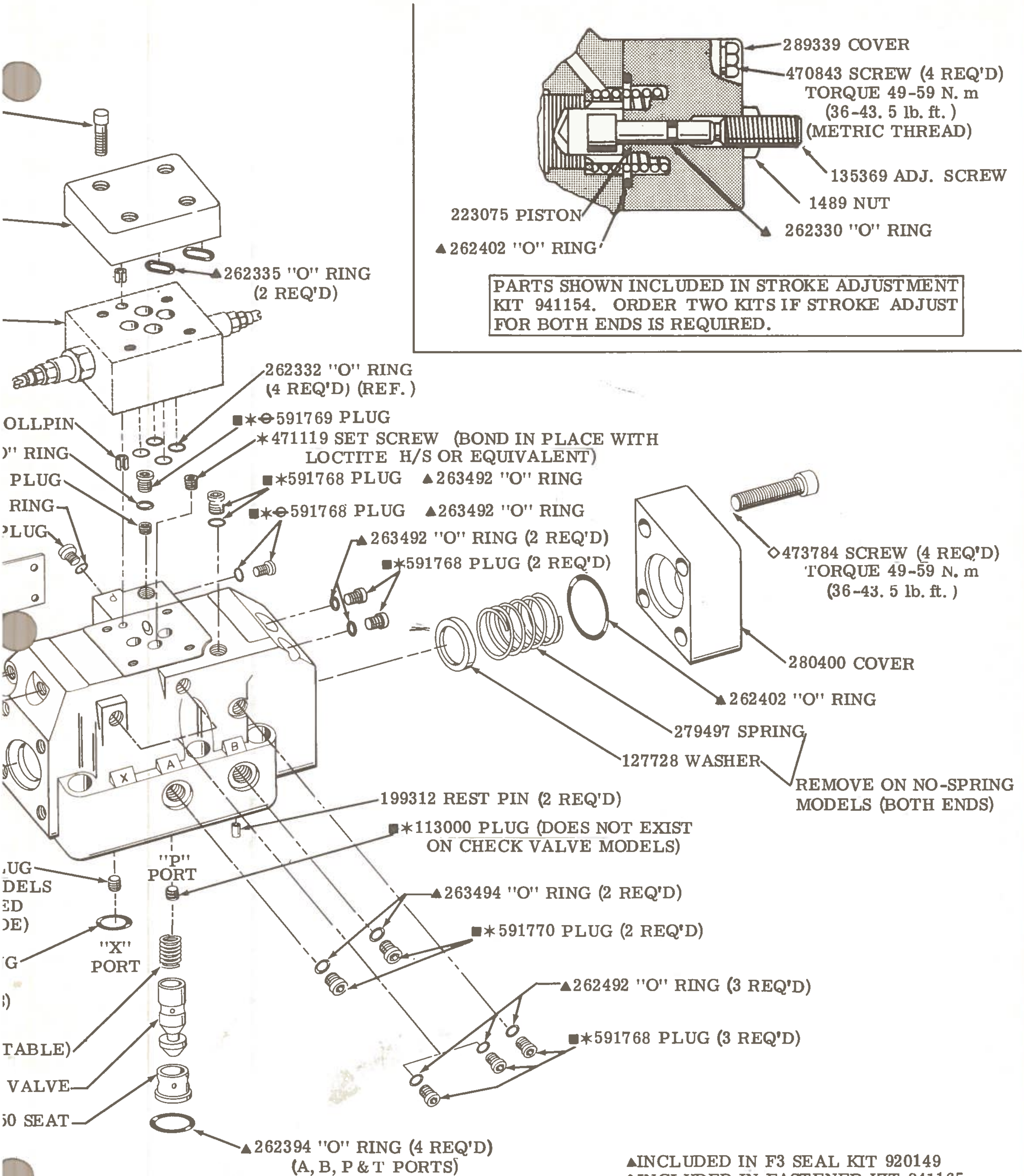
■ PLUG TORQUES (OILED)		
PLUG	TORQUE (N. m)	TORQUE (lb. in.)
113000	5. 0- 5. 9	45-52
591768	9. 8-10. 2	87-90
591769	12. 1-12. 4	107-110
591770	15. 0-16. 6	133-147

NOTE

- PART NUMBERS INCLUDED IN SERVICE KITS WILL NOT BE SOLD SEPARATELY
- ALL THREADED FASTENERS ARE METRIC
- END COVER SCREWS ARE METRIC GRADE 12. 9

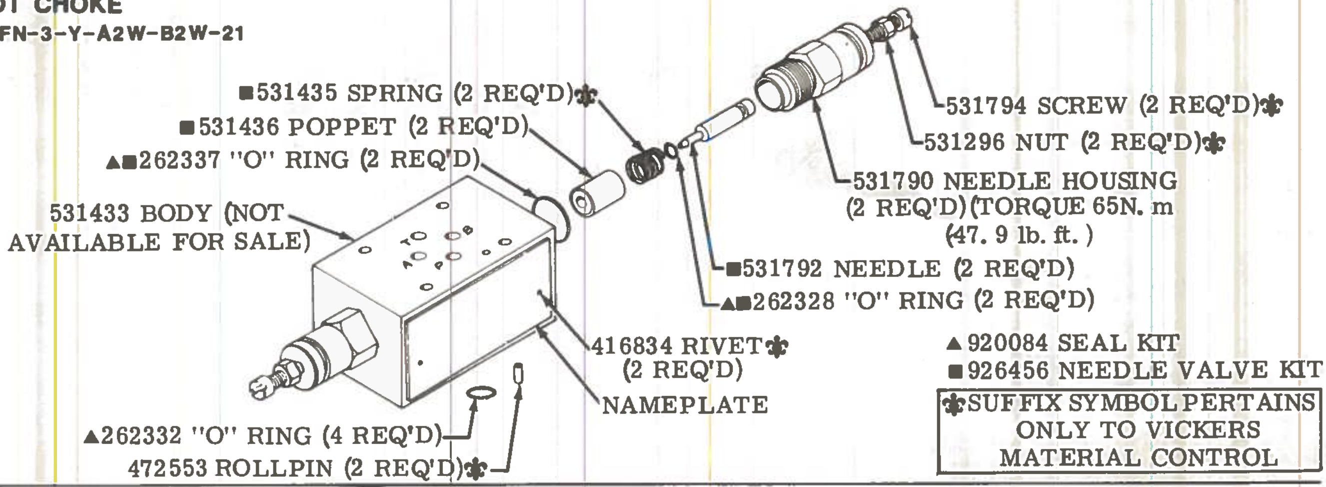


MODEL	⊖ SPRING	COLOR
DG3S-8-*(C)*-*-K-10	398130	———
DG3S-8-*(C)*-*-R-10	398131	YELLOW
DG3S-8-*(C)*-*-S-10	398132	RED



▲INCLUDED IN F3 SEAL KIT 920149
◇INCLUDED IN FASTENER KIT 941165
∗INCLUDED IN PLUG KIT 941167
◆NOT AVAILABLE FOR SALE
⊖USED ON CHECK VALVE MODELS ONLY

PILOT CHOKE
DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN

(F3)-DG3S-8-*-*-*-10**

- (F3) — SPECIAL SEALS FOR MINERAL OIL OR FIRE RESISTANT FLUID
- D — DIRECTIONAL VALVE
- G — SUBPLATE MOUNTED
- 3 — PILOT OPERATED
- S — RATED PRESSURE 210 bar (3000 PSI)
- 8 — INTERFACE C. E. T. O. P. 8
- * — SPOOL TYPE
- * — "C" SPRING CENTERED (OMIT FOR NO-SPRING MODELS)
- * — "X" FAST RESPONSE (OMIT FOR STANDARD MODELS)
- * — SPOOL CONTROL MODIFICATION (OMIT WHEN NOT REQUIRED)
  1. STROKE ADJUSTMENTS
  2. PILOT CHOKE ADJUSTMENTS
  3. PILOT CHOKE & STROKE ADJUSTMENTS
  7. STROKE ADJUSTMENT, CYLINDER "A" END ONLY
  8. STROKE ADJUSTMENT, CYLINDER "B" END ONLY
- * — CHECK VALVE IN PRESSURE PORT (OMIT WHEN NOT REQUIRED)
  - K - 0. 35 bar (5 PSI)
  - R - 3. 45 bar (50 PSI)
  - S - 5. 20 bar (75 PSI)
- 10 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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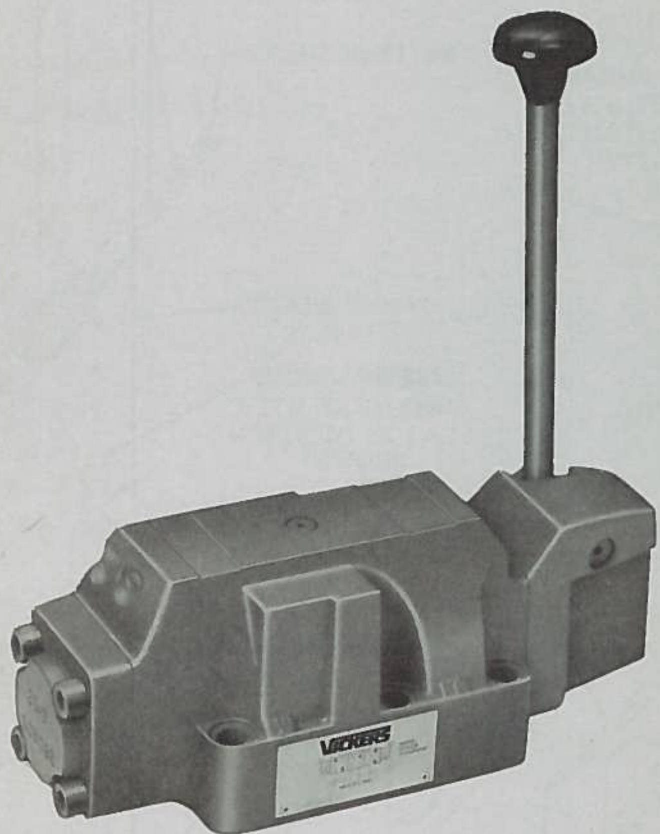
Service Parts Information

Manual Lever Operated Directional Valve

DG17S-8-*A-10
DG17S-8-*C-10
DG17S-8-*N-10



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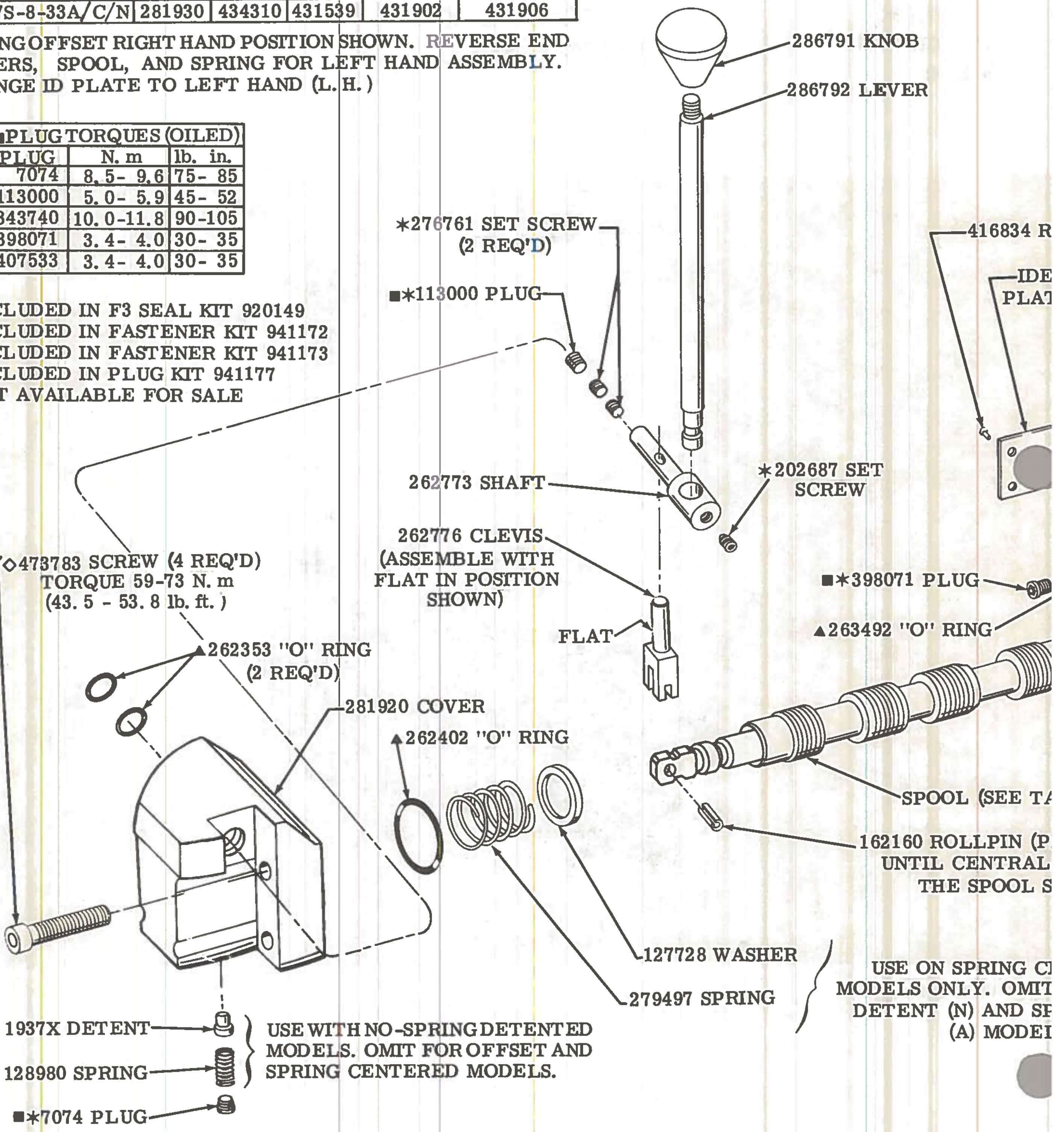
MODEL	SPOOL	ID PLATE WITH CIRCUIT DIAGRAM			
		OFFSET (A)		SPRING	NO-SPRING
		L. H.	R. H.	CENT. (C)	DETENT(N)
DG17S-8-0A/C/N	281922	434310	431539	431900	431903
DG17S-8-2A/C/N	281924			431540	431541
DG17S-8-3C/N	320915	——	——	431901	431904
DG17S-8-4C/N	281926			431549	431905
DG17S-8-6A/C/N	281927	434310	431539	431902	431906
DG17S-8-8C/N	281929	——	——	431459	431905
DG17S-8-33A/C/N	281930	434310	431539	431902	431906

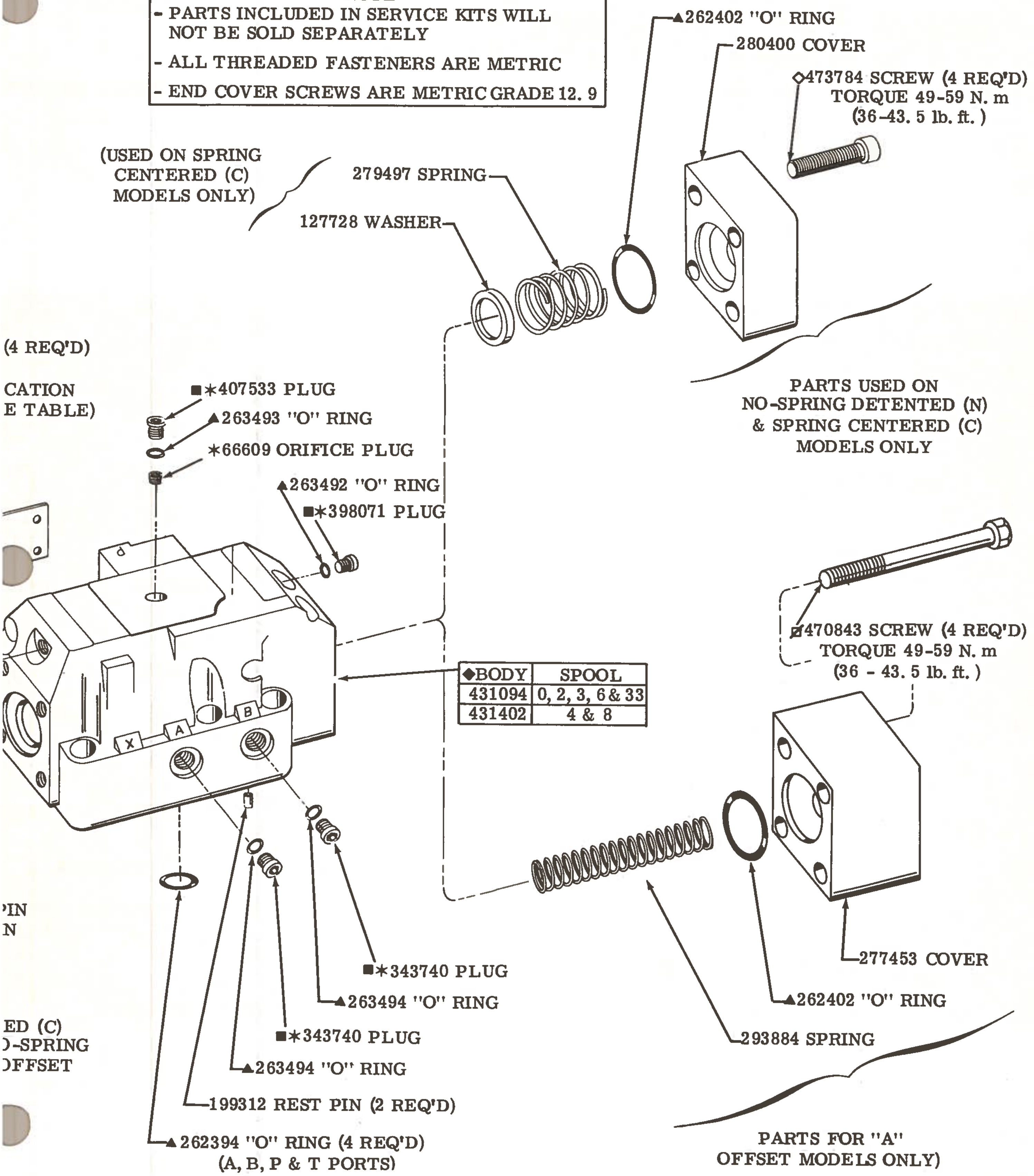
SPRING OFFSET RIGHT HAND POSITION SHOWN. REVERSE END COVERS, SPOOL, AND SPRING FOR LEFT HAND ASSEMBLY. CHANGE ID PLATE TO LEFT HAND (L. H.)

■PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
7074	8. 5- 9. 6	75- 85
113000	5. 0- 5. 9	45- 52
343740	10. 0-11. 8	90-105
398071	3. 4- 4. 0	30- 35
407533	3. 4- 4. 0	30- 35

▲INCLUDED IN F3 SEAL KIT 920149
ø INCLUDED IN FASTENER KIT 941172
◇INCLUDED IN FASTENER KIT 941173
∗INCLUDED IN PLUG KIT 941177
◆NOT AVAILABLE FOR SALE

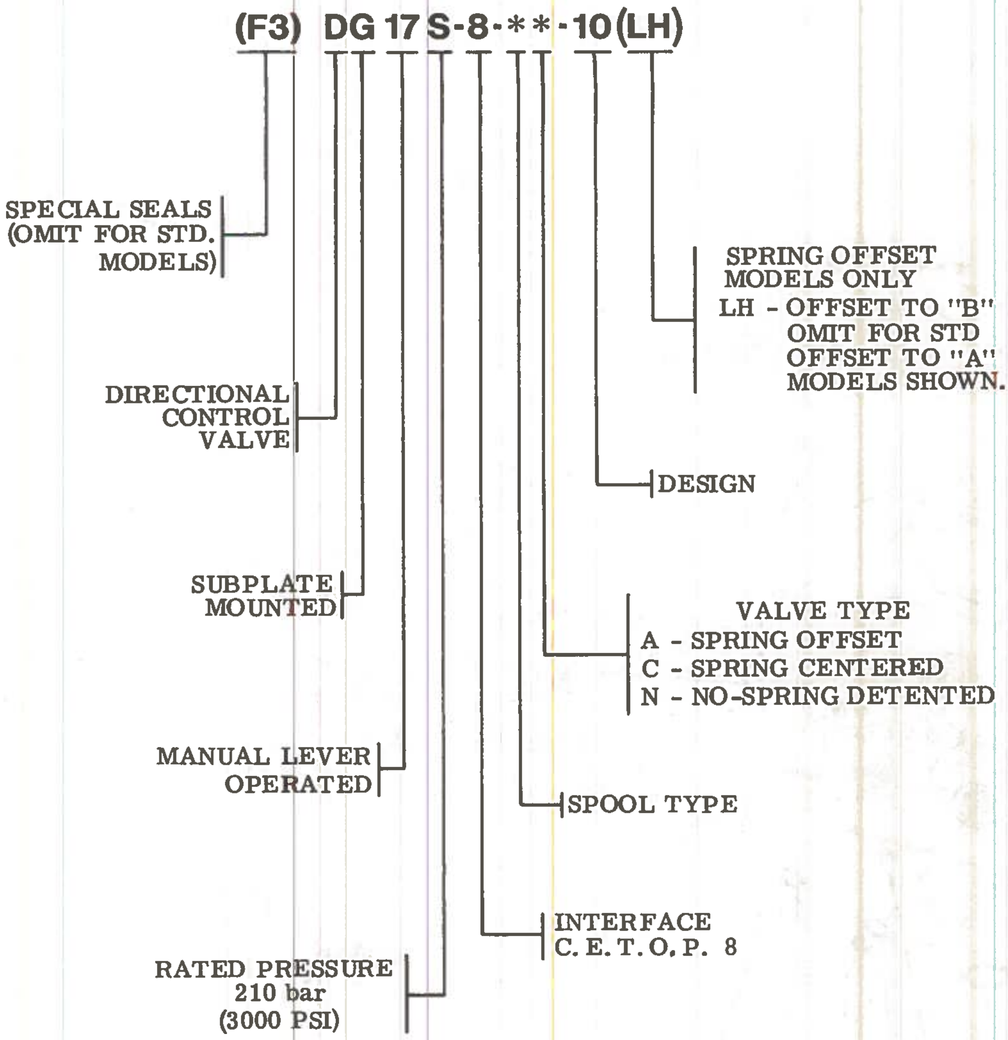


NOTE
- PARTS INCLUDED IN SERVICE KITS WILL NOT BE SOLD SEPARATELY
- ALL THREADED FASTENERS ARE METRIC
- END COVER SCREWS ARE METRIC GRADE 12. 9



◆BODY	SPOOL
431094	0, 2, 3, 6 & 33
431402	4 & 8

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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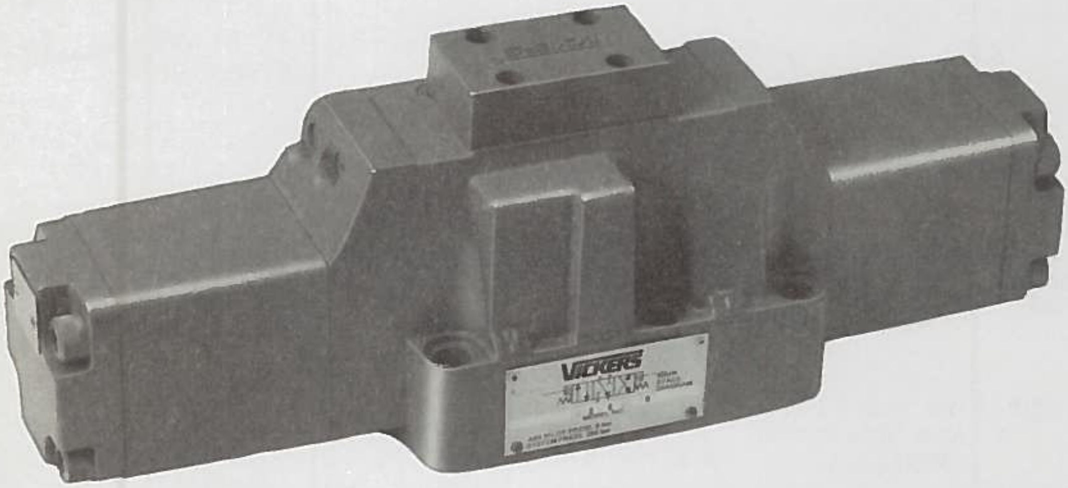
Service Parts Information

Air Operated Directional Valves

DG18S-8-*A-10(LH)
DG18S-8-*C-10
DG18S-8-*-10



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MODEL	SPOOL	I.D. PLATES WITH CIRCUIT DIAGRAM			
		NO SPRING	SPRING CTR'D	SPRING OFFSET L.H.	SPRING OFFSET R.H.
DG18S-8-0*-10	363495	434313	431907	434312	431557
DG18S-8-1*-10	*276623	———	431908	———	———
DG18S-8-2*-10	363496	434313	431555		
DG18S-8-2A-10	276624		———	434312	431557
DG18S-8-3*-10	*276625	———	431909	———	———
DG18S-8-4*-10	276626		431556		
DG18S-8-6*-10	363498	434313	431910	434312	431557
DG18S-8-8*-10	363499	———	431556	———	———
DG18S-8-9*-10	363500	434313	431907	434312	431557
DG18S-8-33*-10	363501		431910		

R.H. ASSEMBLY SHOWN. FOR L.H. ASSEMBLY, AIR OPERATED END PARTS & SPRING OFFSET PARTS ARE INTERCHANGED. ALSO, THE R.H. PLATE IS REMOVED AND REPLACED BY THE L.H. I.D. PLATE.

NOTE

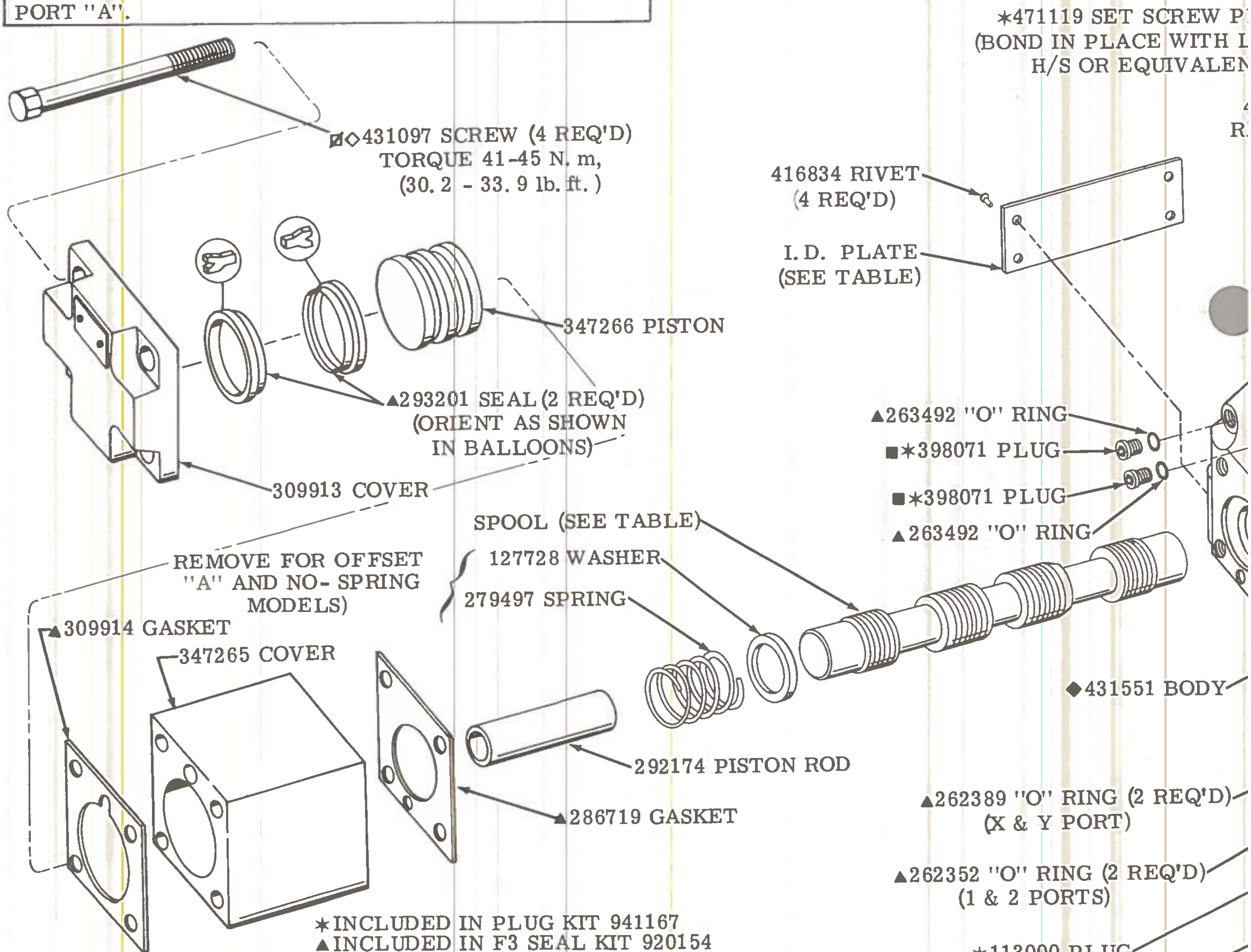
- PARTS INCLUDED IN SERVICE KITS WILL NOT BE SOLD SEPARATELY.
- ALL THREADED FASTENERS ARE METRIC.
- END COVER SCREWS ARE METRIC GRADE 12.9.

■ PLUG TORQUES

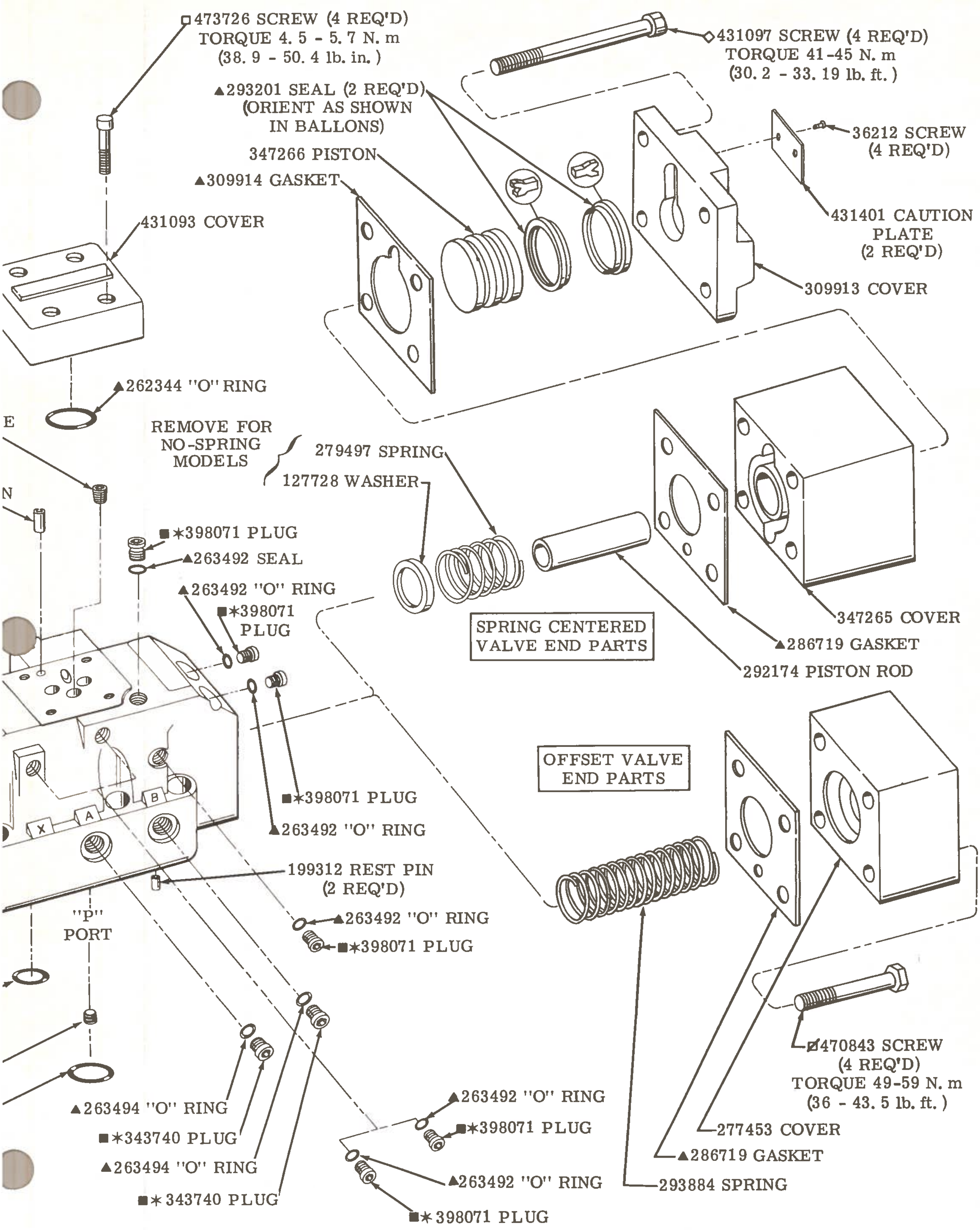
PLUG	TORQUE (N. m.)	TORQUE (lb. in.)
343740	10.0 - 11.8	90 - 105
398071	3.4 - 4.0	30 - 35
407533	3.4 - 4.0	30 - 35

* NOTE

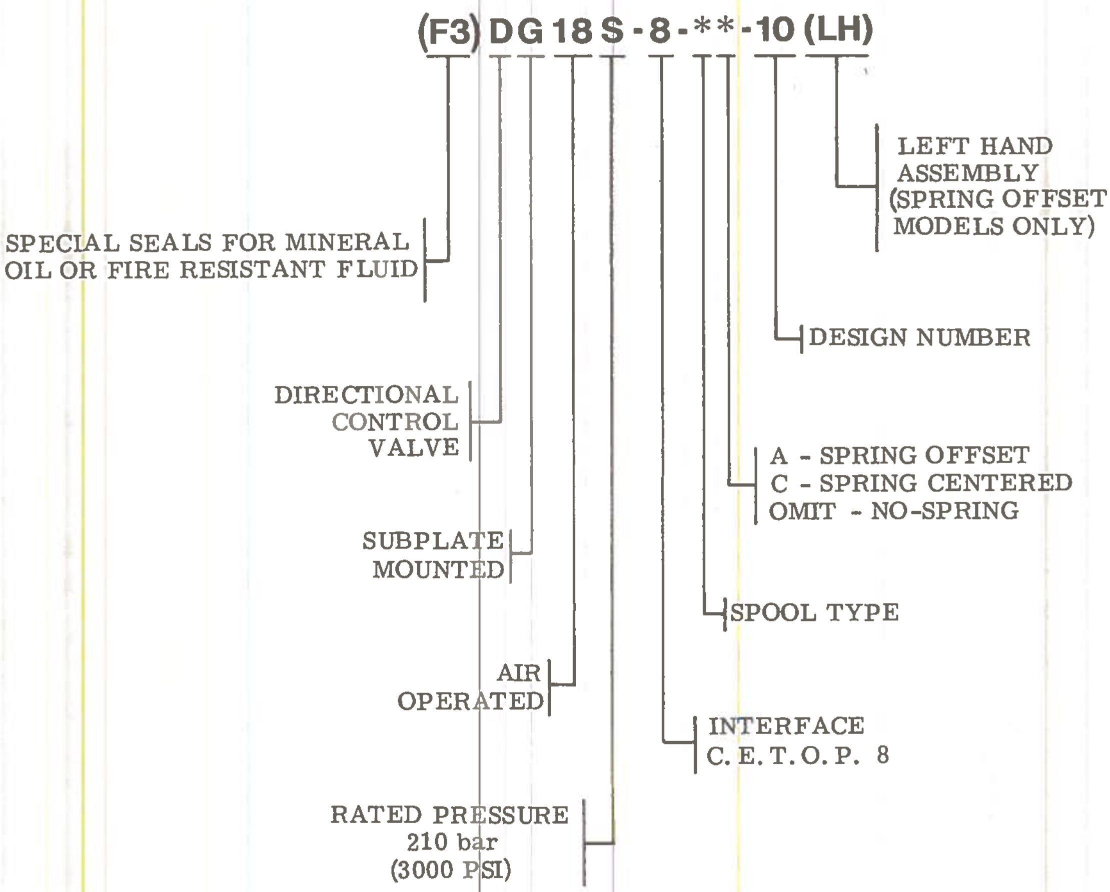
ASSEMBLE TYPE "1" & "3" SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END OF VALVE IS DEFINED AS BEING CLOSEST TO CYLINDER PORT "A".



*INCLUDED IN PLUG KIT 941167
▲INCLUDED IN F3 SEAL KIT 920154
◇INCLUDED IN FASTENER KIT 941174 (SPRING CENTERED UNIT)
⌧INCLUDED IN FASTENER KIT 941179 (SPRING OFFSET UNIT)
□INCLUDED IN FASTENER KIT 941164
◆NOT AVAILABLE FOR SALE


□473726 SCREW (4 REQ'D)
TORQUE 4. 5 - 5. 7 N. m
(38. 9 - 50. 4 lb. in.)
◇431097 SCREW (4 REQ'D)
TORQUE 41-45 N. m
(30. 2 - 33. 19 lb. ft.)
▲293201 SEAL (2 REQ'D)
(ORIENT AS SHOWN
IN BALLONS)
347266 PISTON
▲309914 GASKET
36212 SCREW
(4 REQ'D)
431401 CAUTION
PLATE
(2 REQ'D)
431093 COVER
309913 COVER
▲262344 "O" RING
REMOVE FOR
NO-SPRING
MODELS
279497 SPRING
127728 WASHER
■*398071 PLUG
▲263492 SEAL
▲263492 "O" RING
■*398071
PLUG
SPRING CENTERED
VALVE END PARTS
347265 COVER
▲286719 GASKET
292174 PISTON ROD
OFFSET VALVE
END PARTS
■*398071 PLUG
▲263492 "O" RING
199312 REST PIN
(2 REQ'D)
"P"
PORT
▲263492 "O" RING
■*398071 PLUG
Ø470843 SCREW
(4 REQ'D)
TORQUE 49-59 N. m
(36 - 43. 5 lb. ft.)
▲263492 "O" RING
■*398071 PLUG
▲263494 "O" RING
■*343740 PLUG
▲263494 "O" RING
■* 343740 PLUG
▲263492 "O" RING
■* 398071 PLUG
277453 COVER
▲286719 GASKET
293884 SPRING

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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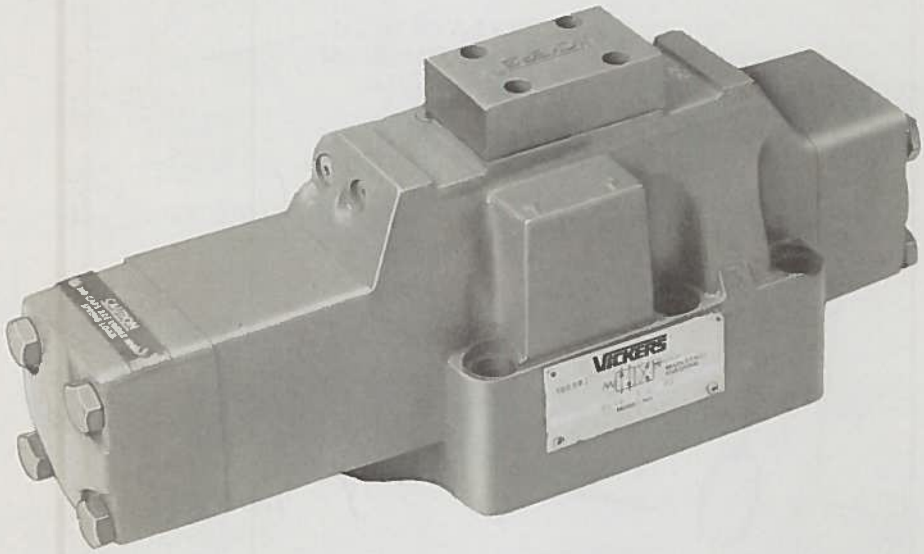
Service Parts Information

Pilot Operated Directional Control Valves

(F3)-DG3S-H8-*A*-*-*-20(LH)



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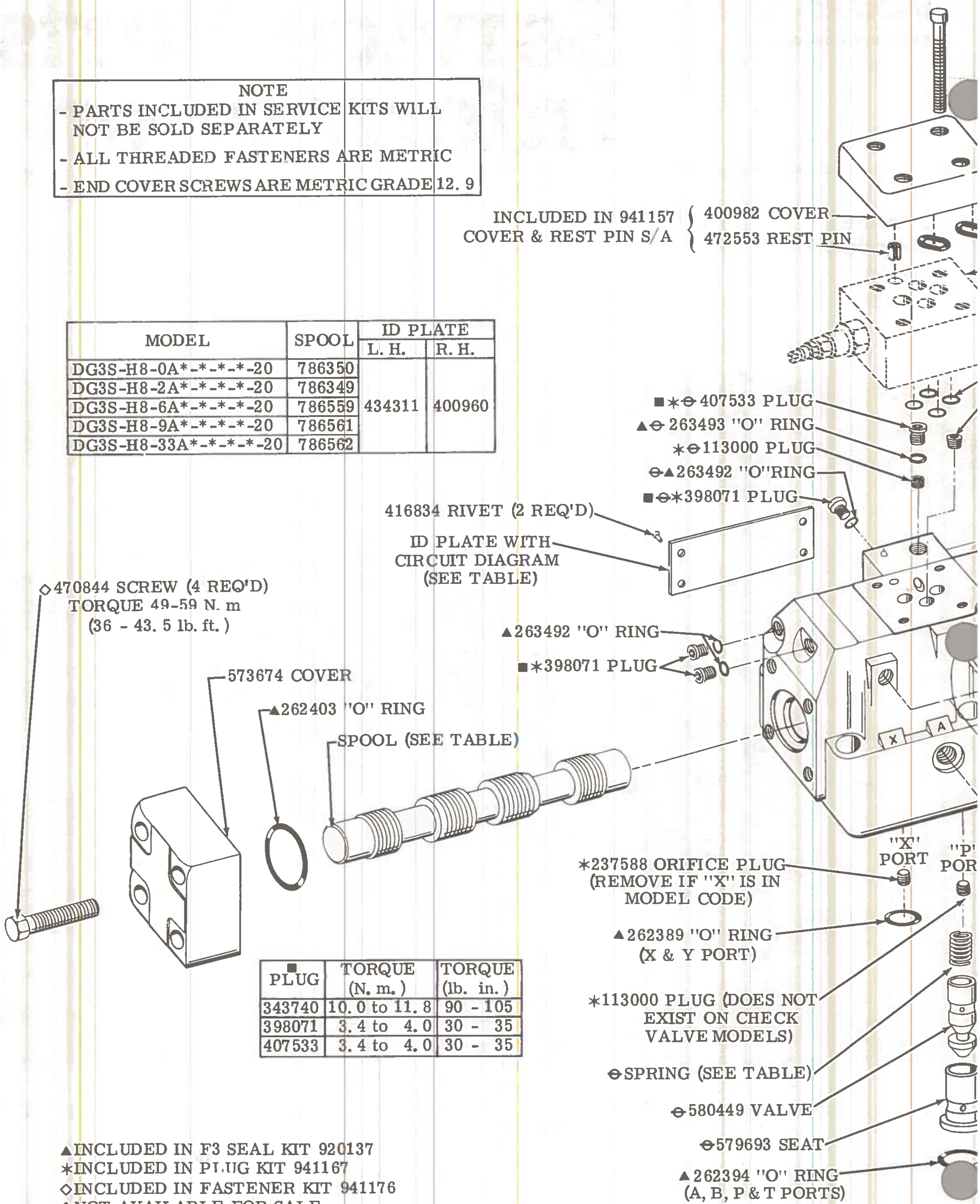
NOTE
- PARTS INCLUDED IN SERVICE KITS WILL NOT BE SOLD SEPARATELY
- ALL THREADED FASTENERS ARE METRIC
- END COVER SCREWS ARE METRIC GRADE 12. 9

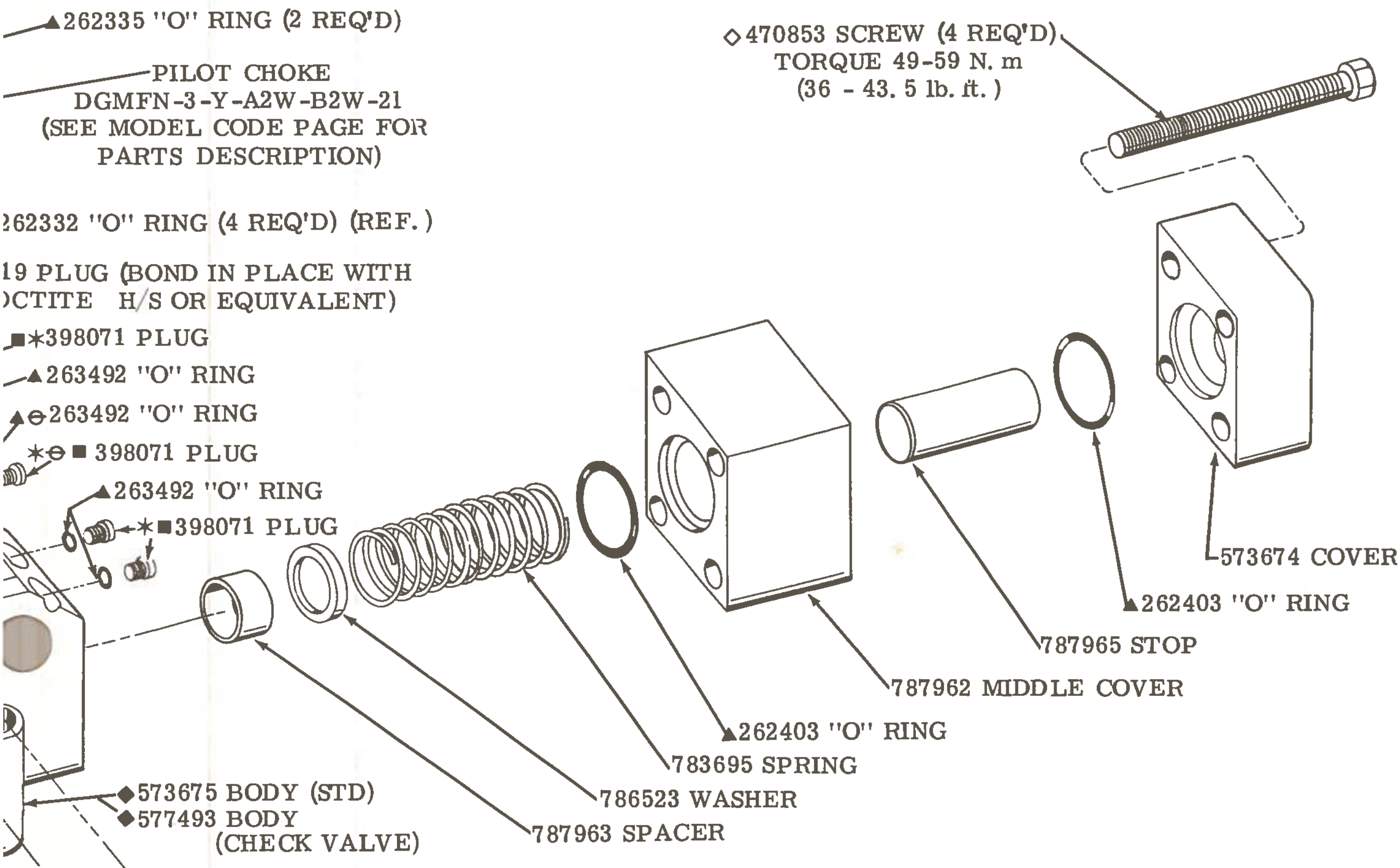
MODEL	SPOOL	ID PLATE	
		L. H.	R. H.
DG3S-H8-0A*-*-*-*-20	786350	434311	400960
DG3S-H8-2A*-*-*-*-20	786349		
DG3S-H8-6A*-*-*-*-20	786559		
DG3S-H8-9A*-*-*-*-20	786561		
DG3S-H8-33A*-*-*-*-20	786562		

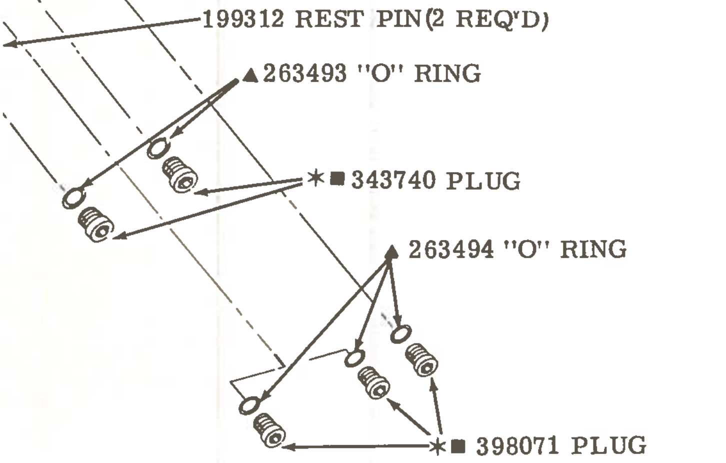


■ PLUG	TORQUE (N. m.)	TORQUE (lb. in.)
343740	10. 0 to 11. 8	90 - 105
398071	3. 4 to 4. 0	30 - 35
407533	3. 4 to 4. 0	30 - 35

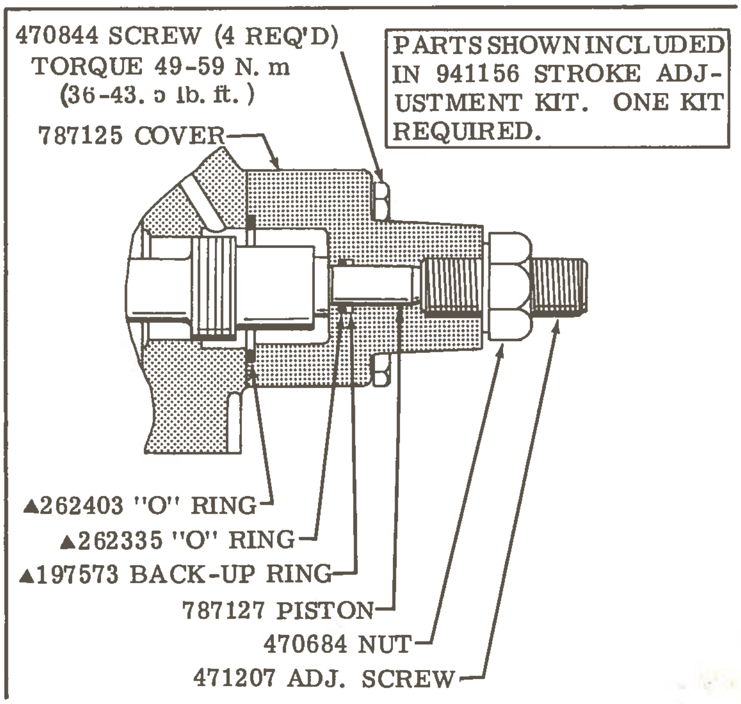
▲INCLUDED IN F3 SEAL KIT 920137
∗INCLUDED IN PLUG KIT 941167
◇INCLUDED IN FASTENER KIT 941176
◆NOT AVAILABLE FOR SALE
⊖USED ON CHECK VALVE MODELS ONLY
■ PLUG TORQUES (SEE TABLE)

BOLT KIT	MODEL
466834	WITHOUT PILOT CHOKE
466836	WITH PILOT CHOKE
TORQUE 4. 5 - 5. 7 N. m (39. 6 - 50. 4 lb. ft.)	

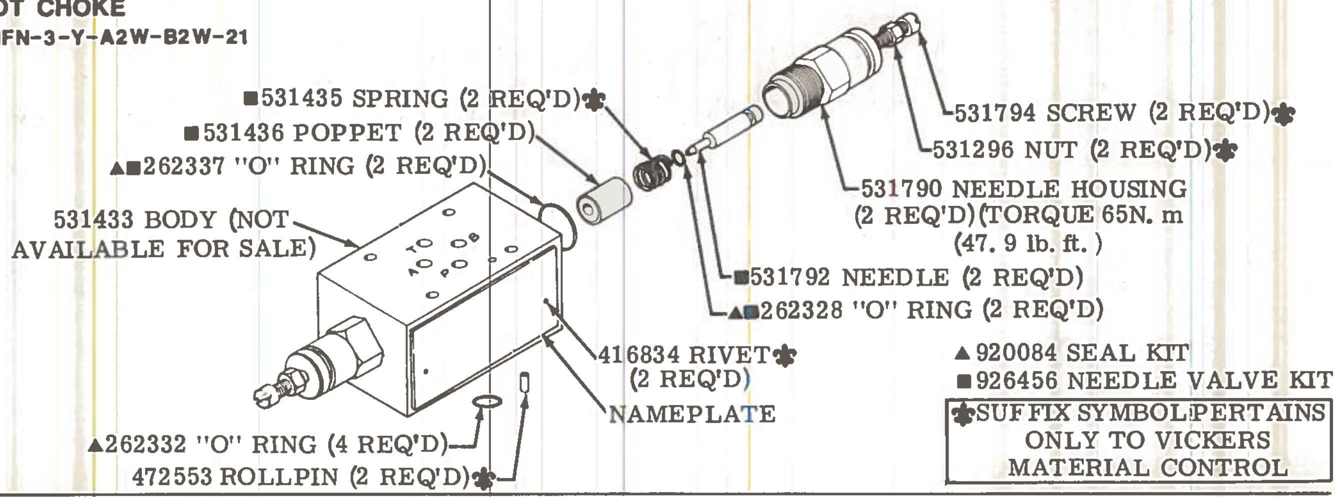




MODEL	⊖ SPRING	COLOR CODE
DG3S-H8-*-*-*-*-K-**-*-10	398130	———
DG3S-H8-*-*-*-*-R-**-*-10	398131	YELLOW
DG3S-H8-*-*-*-*-S-**-*-10	398132	RED



PILOT CHOKE
DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN

(F3)-DG3S-H8-*A*-*-*-20(LH)

- (F3) — SPECIAL SEALS FOR MINERAL OIL OR FIRE RESISTANT FLUID
- D — DIRECTIONAL CONTROL VALVE
- G — SUBPLATE MOUNTED
- 3 — PILOT OPERATED
- S — RATED PRESSURE 210 bar (3000 PSI)
- H8 — (HIGH FLOW) INTERFACE C. E. T. O. P. 8
- * — SPOOL TYPE
- A — VALVE TYPE SPRING OFFSET
- * — "X" FAST RESPONSE (OMIT FOR STANDARD MODELS)
- * — SPOOL CONTROL MODIFICATION
  - 2 - PILOT CHOKE ADJUSTMENTS
  - 7 - STROKE ADJUSTMENT CYLINDER "A" END ONLY (FOR RIGHT HAND MODELS)
  - 8 - STROKE ADJUSTMENT CYLINDER "B" END ONLY (FOR LEFT HAND MODELS)
  - 2-7 IF BOTH ARE REQUIRED
  - 2-8 IF BOTH ARE REQUIRED
- * — CHECK VALVE IN PRESSURE PORT
  - K - 0. 35 bar (5 PSI)
  - S - 5. 20 bar (75 PSI)
- 20 — DESIGN
- (LH) — OFFSET TO "B" (OMIT FOR STD OFFSET TO "A" MODELS)

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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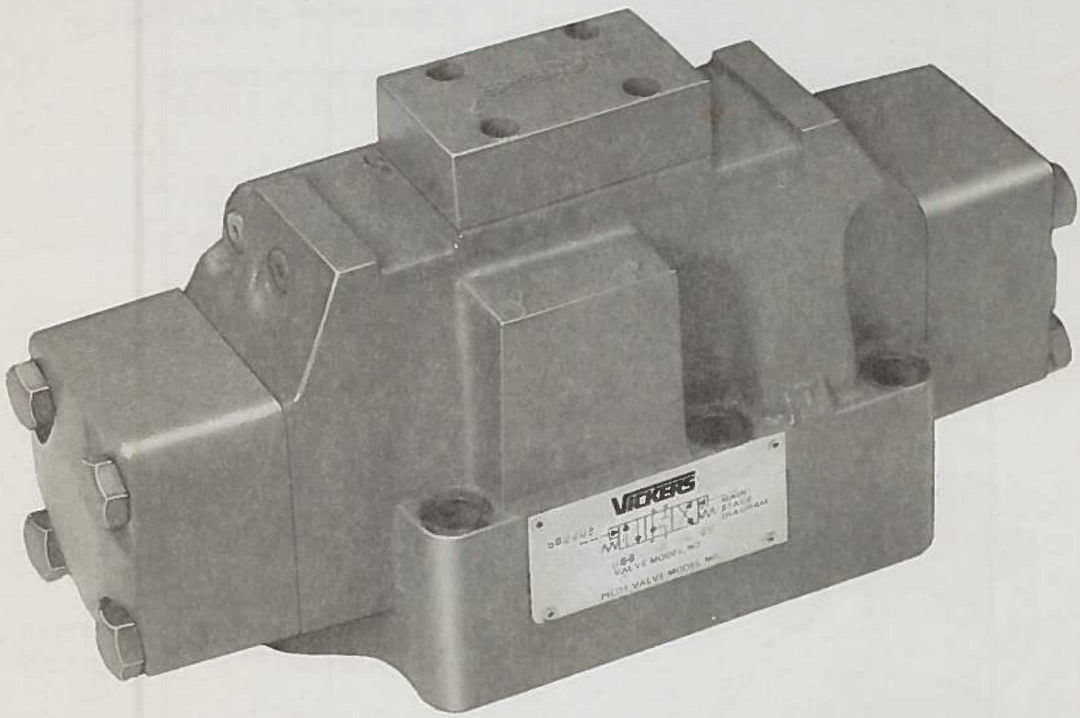
Service Parts Information

Pilot Operated Directional Control Valves

DG3S-H8-*C*-*-*-20 Spring Centered
DG3S-H8-**-*-*-20 No Spring



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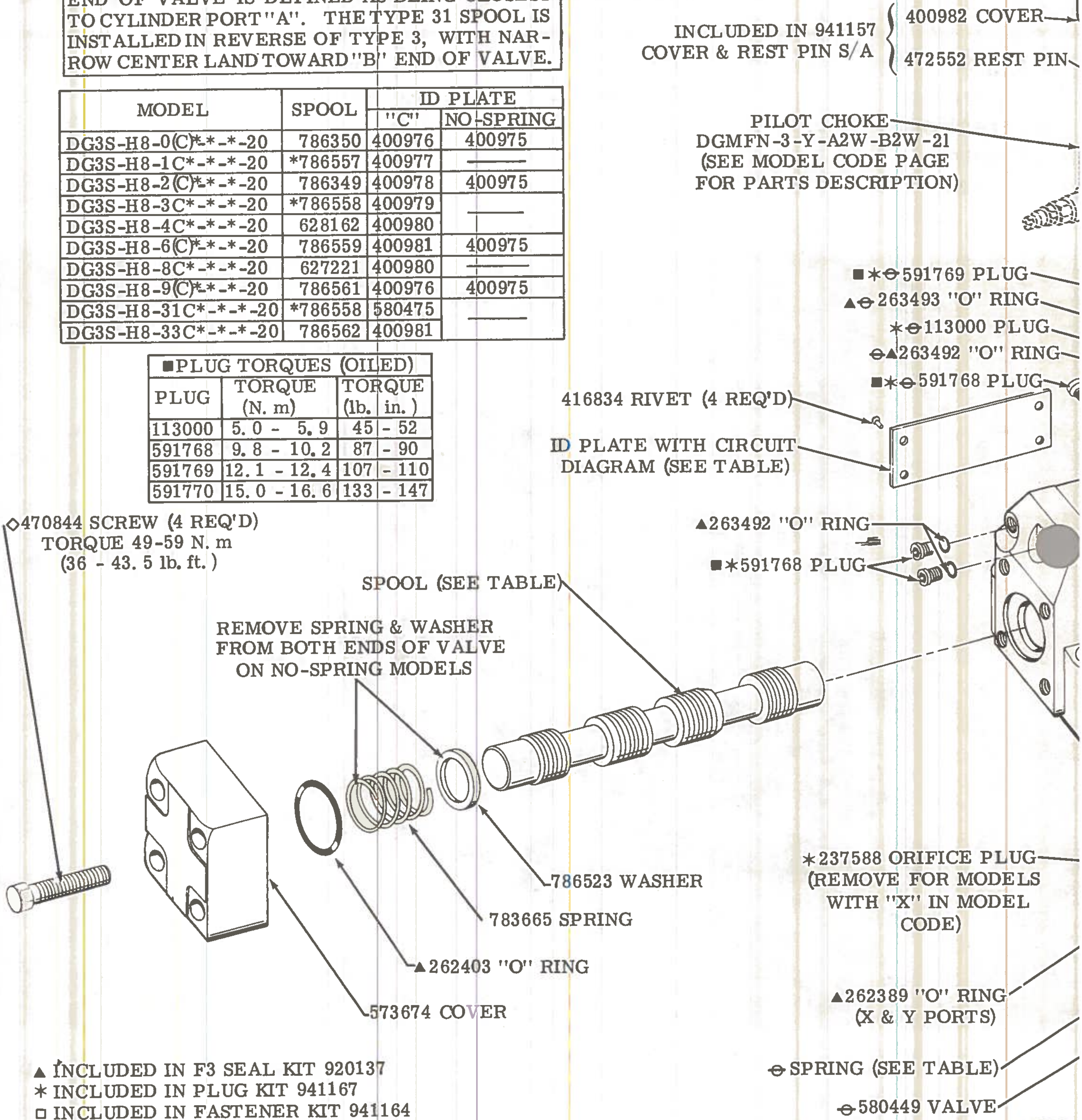
* NOTE

ASSEMBLE TYPE 1 AND 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END OF VALVE IS DEFINED AS BEING CLOSEST TO CYLINDER PORT "A". THE TYPE 31 SPOOL IS INSTALLED IN REVERSE OF TYPE 3, WITH NARROW CENTER LAND TOWARD "B" END OF VALVE.

MODEL	SPOOL	ID PLATE	
		"C"	NO-SPRING
DG3S-H8-0(C)*-*-*-20	786350	400976	400975
DG3S-H8-1C*-*-*-20	*786557	400977	———
DG3S-H8-2(C)*-*-*-20	786349	400978	400975
DG3S-H8-3C*-*-*-20	*786558	400979	———
DG3S-H8-4C*-*-*-20	628162	400980	
DG3S-H8-6(C)*-*-*-20	786559	400981	400975
DG3S-H8-8C*-*-*-20	627221	400980	———
DG3S-H8-9(C)*-*-*-20	786561	400976	400975
DG3S-H8-31C*-*-*-20	*786558	580475	———
DG3S-H8-33C*-*-*-20	786562	400981	

■PLUG TORQUES (OILED)

PLUG	TORQUE (N. m)	TORQUE (lb. in.)
113000	5. 0 - 5. 9	45 - 52
591768	9. 8 - 10. 2	87 - 90
591769	12. 1 - 12. 4	107 - 110
591770	15. 0 - 16. 6	133 - 147

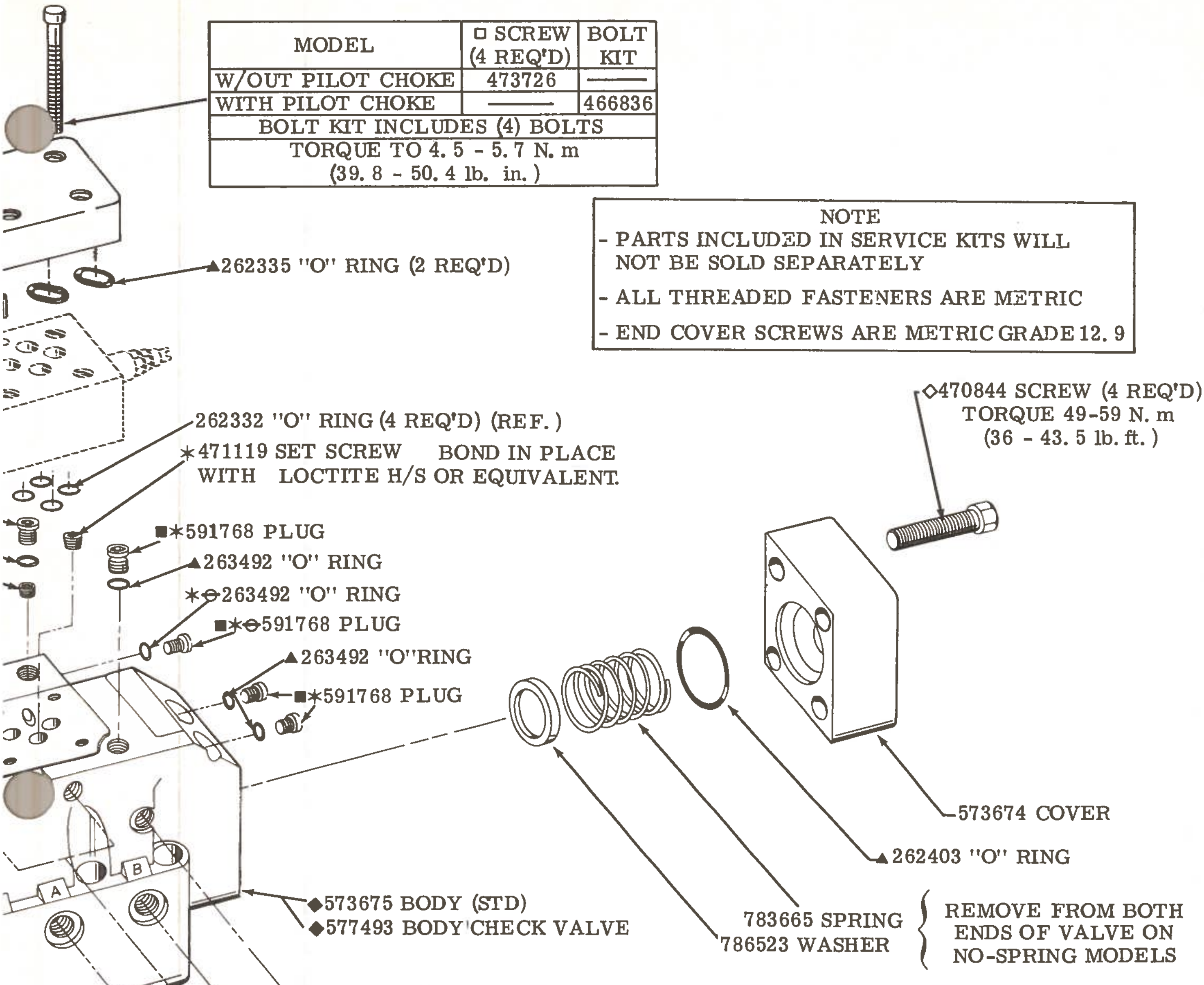


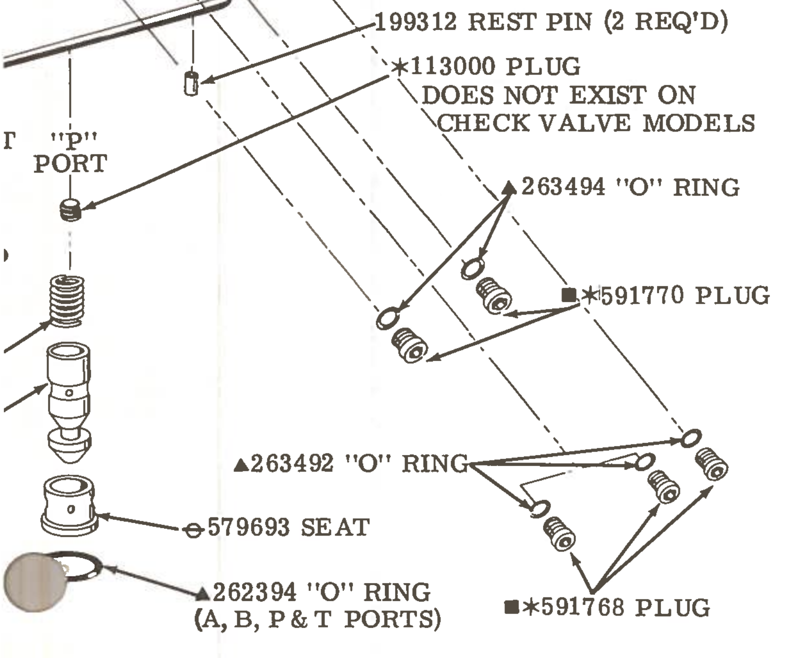
▲ INCLUDED IN F3 SEAL KIT 920137
∗ INCLUDED IN PLUG KIT 941167
□ INCLUDED IN FASTENER KIT 941164
◇ INCLUDED IN FASTENER KIT 941175
◆ NOT AVAILABLE FOR SALE
⊖ USED ON CHECK VALVE MODELS ONLY

MODEL	⊖ SPRING	COLOR
DG3S-H8-*(C)*-*-*-K-20	398130	———
DG3S-H8-*(C)*-*-*-R-20	398131	YELLOW
DG3S-H8-*(C)*-*-*-S-20	398132	RED

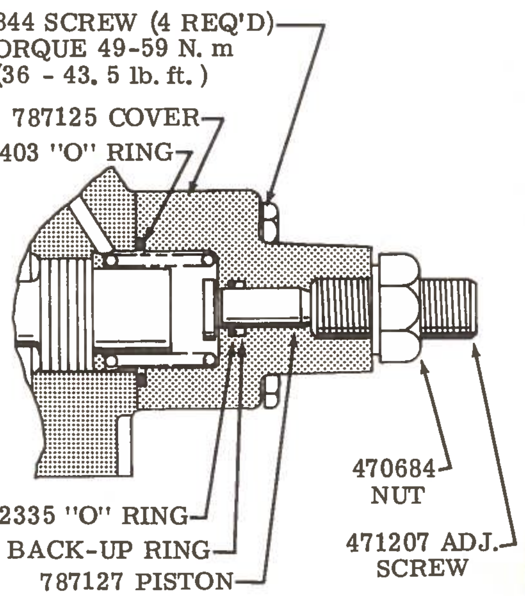
MODEL	□ SCREW (4 REQ'D)	BOLT KIT
W/OUT PILOT CHOKE	473726	———
WITH PILOT CHOKE	———	466836
BOLT KIT INCLUDES (4) BOLTS		
TORQUE TO 4.5 - 5.7 N. m (39.8 - 50.4 lb. in.)		

NOTE
- PARTS INCLUDED IN SERVICE KITS WILL NOT BE SOLD SEPARATELY
- ALL THREADED FASTENERS ARE METRIC
- END COVER SCREWS ARE METRIC GRADE 12.9

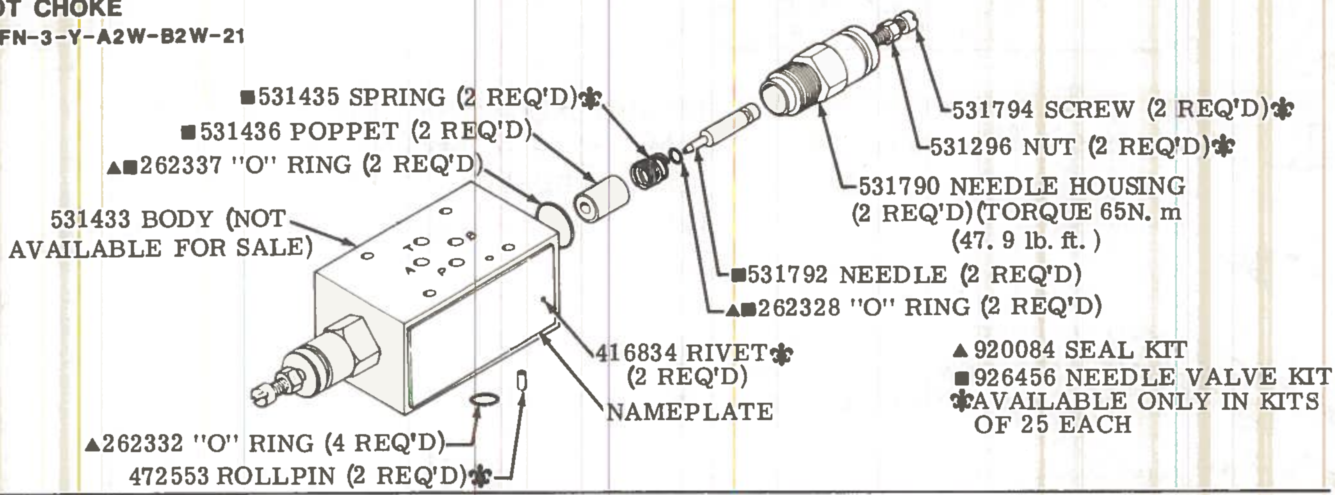




PARTS SHOWN INCLUDED IN 941156 STROKE ADJ KIT. ORDER TWO KITS IF STROKE ADJ FOR BOTH ENDS IS REQUIRED.



PILOT CHOKE
DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN

(F3) - D G 3 S - H 8 - * * * - * - * - 20 (LH)

- (F3) — SEALS FOR MINERAL OIL AND FIRE RESISTANT FLUIDS
- D — DIRECTIONAL VALVE
- G — SUBPLATE MOUNTED
- 3 — PILOT OPERATED
- S — RATED PRESSURE 210 bar (3000 PSI)
- H8 — HIGH FLOW INTERFACE C. E. T. O. P. 8
- * — SPOOL TYPE
- * — VALVE TYPE
  C - SPRING CENTERED
  OMIT FOR NO-SPRING MODELS
- * — "X" - FAST RESPONSE MODEL
  OMITTED - STANDARD MODELS
- * — SPOOL CONTROL MODIFICATION (OMIT WHEN NOT REQUIRED)
  1 - STROKE ADJUSTMENT
  2 - PILOT CHOKE
  3 - PILOT CHOKE AND STROKE ADJUSTMENTS
  7 - STROKE ADJUSTMENT "A" END ONLY
  8 - STROKE ADJUSTMENT "B" END ONLY
- * — CHECK VALVE IN PRESSURE PORT
  K - 0. 35 bar (5 PSI)
  S - 5. 20 bar (75 PSI)
- 20 — DESIGN
- (LH) — OFFSET TO "B"
  OMIT FOR STD. OFFSET TO "A" MODELS.

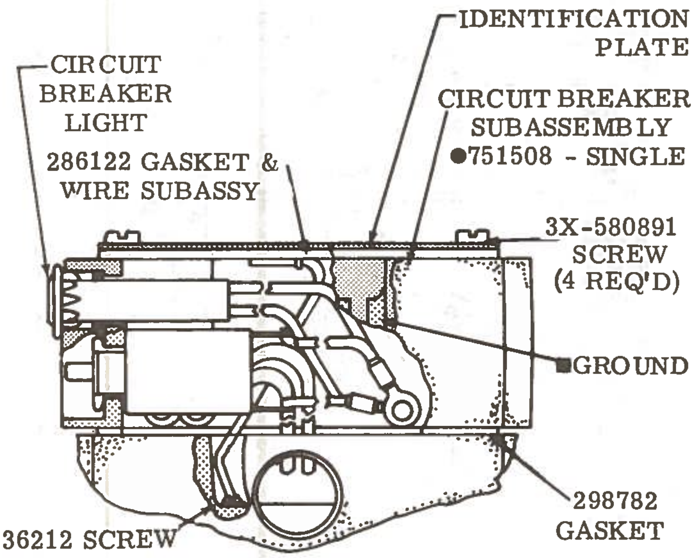
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

DIRECTIONAL VALVES ELECTRICAL ACCESSORIES

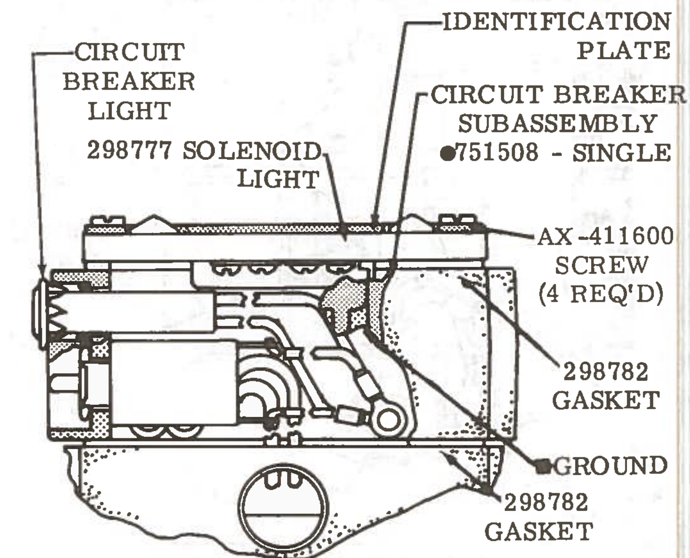
VICKERS®
A TRINOVA COMPANY

SINGLE SOLENOID
MODEL: DF or DG*S*B - CIRCUIT BREAKER



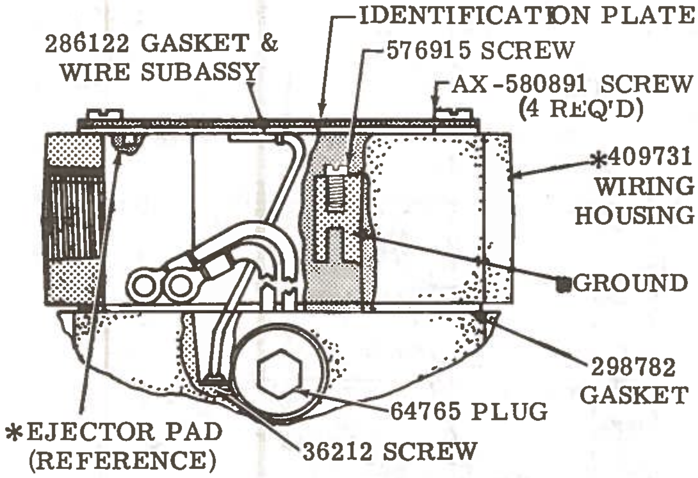
AVAILABLE ON SPRING OFFSET MODELS ONLY

SINGLE SOLENOID
DOUBLE SOLENOID REQUIRES "LWB"
MODEL: DF or DG*S*LB- CIRCUIT BREAKER & SOLENOID LIGHTS

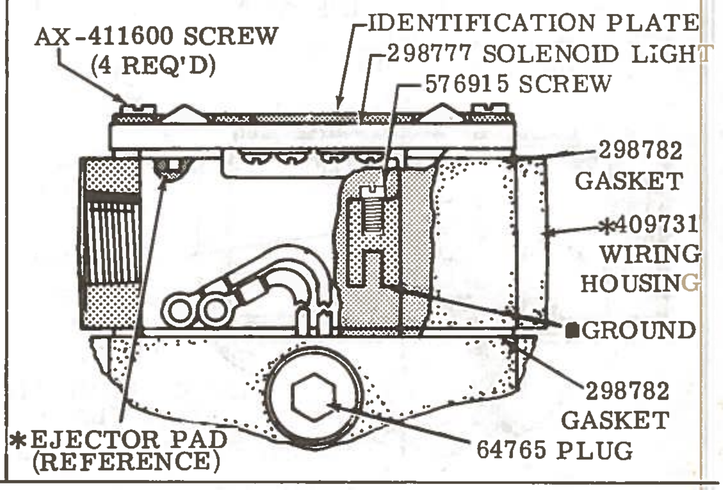


AVAILABLE ON SPRING OFFSET MODELS ONLY

▲942332 - SINGLE/DOUBLE SOLENOID
MODEL: DF or DG*S*W - WIRING HOUSING



▲942335 - SINGLE/DOUBLE SOLENOID
MODEL: DF or DG*S*LW-
SOLENOID LIGHTS & WIRING HOUSING



● ASSEMBLE WITH CIRCUIT BREAKER AND LIGHT OVER SOLENOID.

ELECTRICAL CIRCUIT DIAGRAM IS SHOWN ON UNDERSIDE OF IDENTIFICATION PLATE.

NOTE: CIRCUIT BREAKER OPTION IS NOT AVAILABLE WITH WET ARMATURE SOLENOID VALVES.

■ GROUND PROVIDED FOR #8 SELF-TAPPING SCREW FOR CUSTOMERS CONVENIENCE. THE HOUSINGS MAY BE CONNECTED TOGETHER AND GROUNDED TO THE DG-01 BODY.

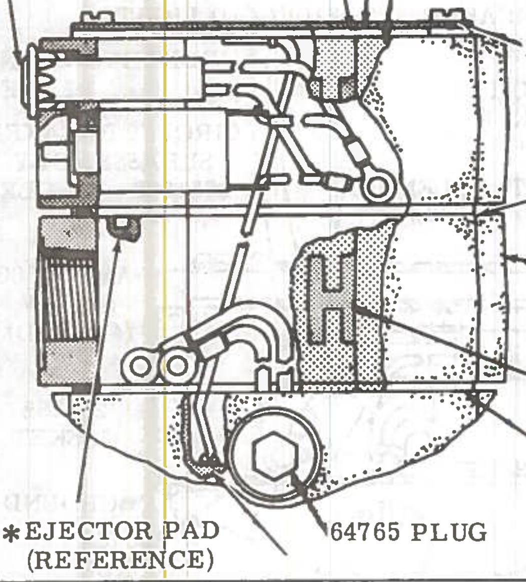
▲ SERVICE KITS INCLUDE ALL PARTS SHOWN.

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

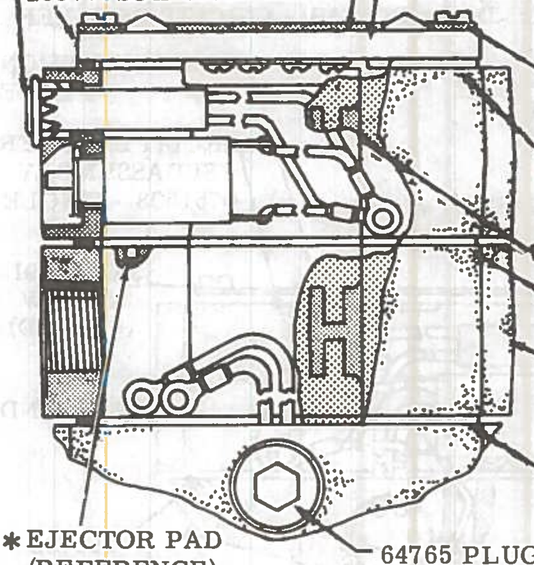
Revised 1-1-85

I-3465-S

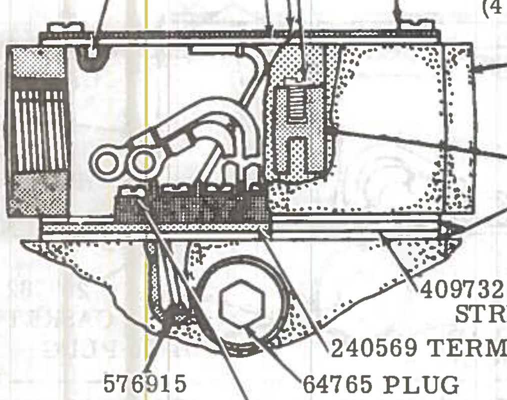
SINGLE SOLENOID
DOUBLE SOLENOID
MODEL: DF or DG*S*WB
WIRING HOUSING & CIRCUIT BREAKER



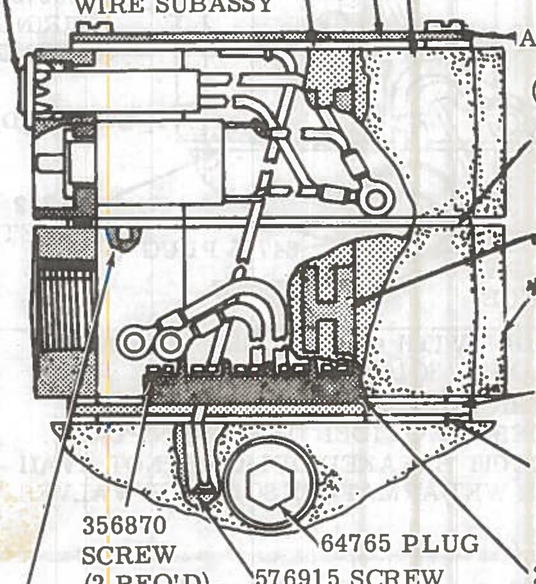
SINGLE SOLENOID
DOUBLE SOLENOID
MODEL: DF or DG*S*LWB SOLENOID LIGHT
WIRING HOUSING & CIRCUIT BREAKER



SINGLE/DOUBLE SOLENOID
MODEL: DF or DG*S*WT
WIRING HOUSING & TERMINAL STRIP



SINGLE SOLENOID
DOUBLE SOLENOID
MODEL: DF or DG*S*WTB TERMINAL STRIP
WIRING HOUSING & CIRCUIT BREAKER



* #409731 WIRING HOUSING
ASSEMBLE HOUSING WITH EJECTOR PADS UP AND WITH ELECTRICAL CONDUIT CONNECTION OVER SOLENOID "B". (SOLENOIDS "A" & "B" ARE IDENTIFIED ON UNITS BY DIAGRAM PLATE ON SIDE OF PILOT VALVE. FOR TYPE "4" & "8" SPOOLS CONDUIT CONNECTION LOCATION ON END OF "W" WIRING HOUSING IS REVERSED).

Litho in U.S.A.

Service Parts Information

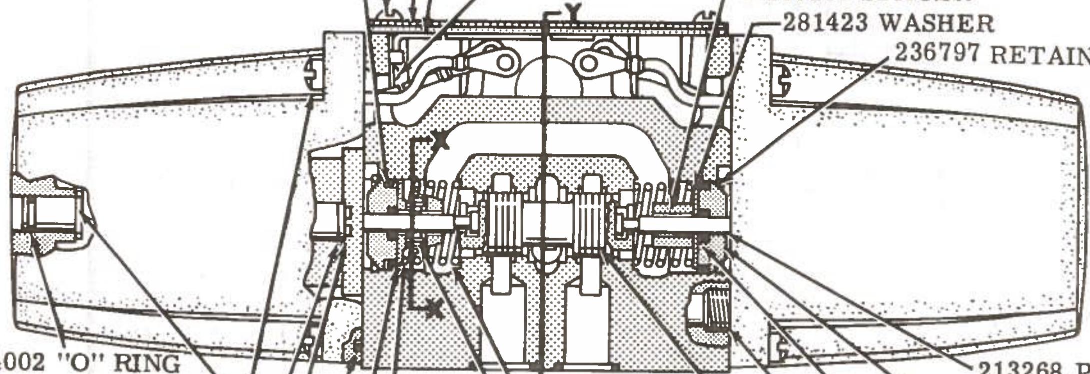
VICKERS®
A TRINOVA COMPANY

NO-SPRING DETENTED SOLENOID CONTROLLED DIRECTIONAL VALVES

DG4S*(L)-01*N-(***AC)*-51

VOLTAGE	SOLENOID S/A	COIL S/A	SOLENOID S/A F3	COIL S/A F3
115 AC 60	281291	316011	317767	317768
230 AC 60	281292	298721	317769	317770
460 AC 60	281293	298722	317771	317772

FOR ADDITIONAL SOLENOID S/A SEE I-3544-S



MODEL	DIAGRAM PLATE
DG4S2-	577485
DG4S4-	577486

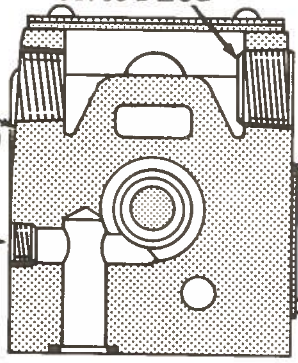
MODEL	SPOOL
DG4S2(L)-012N-51	289186
DG4S4(L)-010N-51	213230
DG4S4(L)-012N-51	213231
DG4S4(L)-016N-51	213232
DG4S4(L)-017N-51	236624
DG4S4(L)-0133N-51	236615

*TORQUE TO 30 - 35 lb. in.

281421 BODY (NOT AVAILABLE FOR SALE)

■157477 ROLLPIN

SECTION X-X



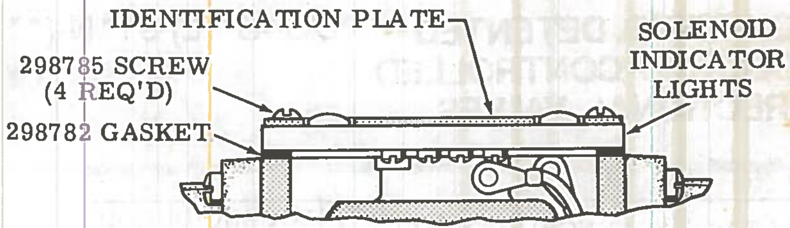
SECTION Y-Y

▲INCLUDED IN F3 SEAL KIT 919214

■ INCLUDED IN 942132, 51 DESIGN DETENT S/A

SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615

FOR MODELS WITH SOLENOID INDICATOR LIGHTS



MODEL CODE BREAKDOWN

DG4S * (L) -01 * N-(*AC**)- 51**

- DG — DIRECTIONAL VALVE
- 4 — SUBPLATE OR MANIFOLD MOUNTED
- S — SOLENOID OPERATED
- S — SLIDING SPOOL
- * — FLOW DIRECTIONS
  - 2-2 WAY
  - 4-4 WAY
- (L) — L-SOLENOID INDICATOR LIGHTS; OMITTED-NONE
- 01 — SERIES 10
- * — SPOOL TYPE
- N — NO-SPRING DETENTED
- (***AC**) — SOLENOID VOLTAGE AND FREQUENCY; OMITTED-115VAC60 STANDARD
- 51 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

SPRING CENTERED DIRECTIONAL VALVES

DG4S4-01*(*)C-(*)-50

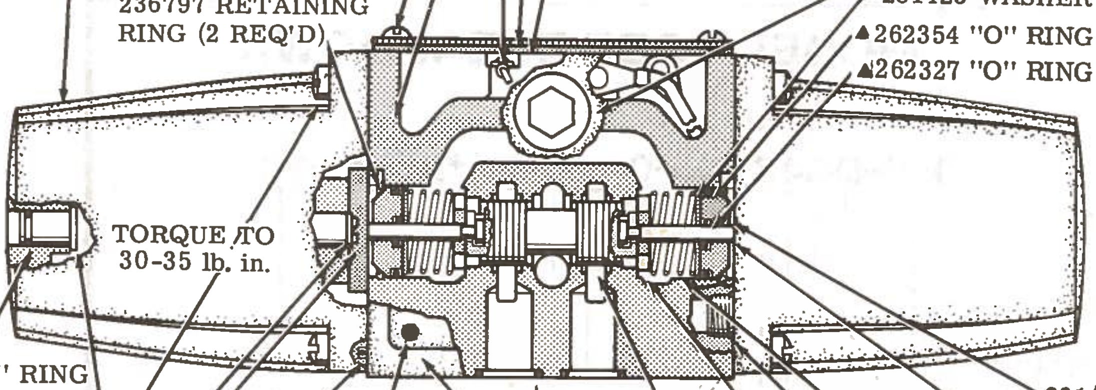
DG4S2-012C-(*)-50

VICKERS® A TRINOVA COMPANY

NOTE
FOR 50/60 CYCLE SOLENOIDS SEE BACK PAGE

FOR ADDITIONAL SOLENOID S/A'S SEE I-3544-S.

VOLTAGE	SOLENOID S/A (2 REQ'D)			
	S/A COMPLETE		COIL	
	STD	F3	STD	F3
115 AC 60	281291	317767	316011	317768
230 AC 60	281292	317769	298721	317770
460 AC 60	281293	317771	298722	317772



MODEL	DIAGRAM PLATE	SPOOL	WASHER (2 REQ'D)	SPRING (2 REQ'D)	PUSH PIN (2 REQ'D)
DG4S2-012C-(*)-50	290339	289186	211846	290072	213268
DG4S4-010C-(*)-50	290341	213230			
DG4S4-011C-(*)-50	290342	*276278			
DG4S4-012C-(*)-50	290343	213231			
DG4S4-013C-(*)-50	290344	*239903			
DG4S4-016C-(*)-50	290345	213232			
DG4S4-0168C-(*)-50	577480	213232			
DG4S4-017C-(*)-50	290346	236624			
DG4S4-0178C-(*)-50	577482	236624			
DG4S4-018C-(*)-50	290340	235637	□ 283637	217323	290264
DG4S4-0133C-(*)-50	577484	236615	211846	290072	213268

* ASSEMBLE RELIEVED LAND OF TYPE 1 & NARROW LAND OF TYPE 3 SPOOLS TOWARD "A" PORT.

□ ASSEMBLE ON SPOOL WITH SHARP BREAK EDGE TOWARD SPRING.

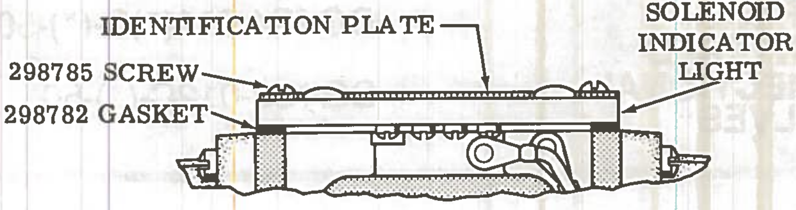
▲INCLUDED IN 919214 SEAL KIT

◆NOT AVAILABLE FOR SALE

SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615

NOTE
REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURE.

FOR MODELS WITH SOLENOID INDICATOR LIGHTS



50/60 HERTZ SOLENOIDS		
MODEL	SOLENOID S/A (2 REQ'D)	COIL
DG*S4-****-115AC-50/60-5*	751137	751057
F3-DG*S4-****-115AC-50/60-5*	751407	751406

LEAD WIRE IDENTIFICATION
RED LEAD - COMMON
YELLOW LEAD - 60 Hz
BLUE LEAD - 50 Hz

CAUTION
FOR 50 CYCLE OPERATION USE RED AND BLUE LEADS
FOR 60 CYCLE OPERATION USE RED AND YELLOW LEADS
DO NOT USE BLUE AND YELLOW LEADS TOGETHER

MODEL CODE BREAKDOWN

(F3)-DG4S*(L)-01*C-(*AC**)-50**

- (F3) — MULTI-FLUID CAPABILITY (VITON SEALS)
- D — DIRECTIONAL VALVE
- G — GASKET MOUNTED
- 4 — SOLENOID OPERATED
- S — SLIDING SPOOL
- * — FLOW DIRECTIONS: 2-2 WAY, 4-4 WAY
- (L) — L - SOLENOID INDICATOR LIGHT; OMITTED-NONE
- 01 — SERIES
- * — SPOOL TYPE
- C — SPRING CENTERED
- (***AC**) — SOLENOID VOLTAGE AND FREQUENCY; OMITTED-115VAC60 STANDARD
- 50 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

SPRING OFFSET DIRECTIONAL VALVES

VICKERS®
A TRINOVA COMPANY

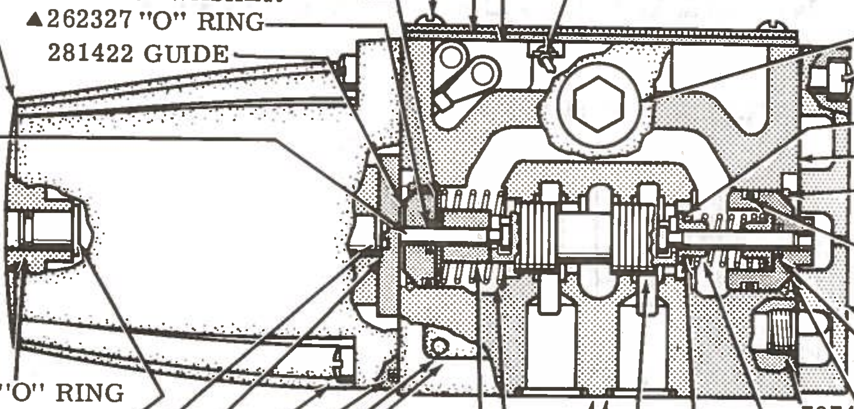
DG4S2(L)-012A-(***AC**)-50
DG4S4(L)-01*A-(***AC**)-50

RIGHT HAND ASSEMBLY SHOWN. IN LEFT HAND ASSEMBLY ALL PARTS OF VALVE EXCEPT BODY ARE REVERSED. EXAMPLE OF L.H. MODEL:
DG4S4(L)-012A-50-LH

NOTE
FOR 50/60 CYCLE SOLENOIDS SEE BACK PAGE

VOLTAGE	SOLENOID S/A			
	S/A COMPLETE		COIL	
	STD	F3	STD	F3
115AC60	281291	317767	316011	317768
230AC60	281292	317769	298721	317770
460AC60	281293	317771	298722	317772

FOR ADDITIONAL SOLENOID S/A'S SEE I-3544-S.



MODEL	DIAGRAM PLATE	
	RH	LH
DG4S2(L)-	290347	577488
DG4S4(L)-	290348	577490

MODEL	SPOOL	PUSH PIN	LIMITER (2 REQ'D)	GUIDE	"O" RING
DG4S2(L)-012A-(*)-50	220344	———	———	281424	———
DG4S4(L)-010A-(*)-50	213230	220234	294226	284931	262327 ▲
DG4S4(L)-012A-(*)-50	213231				
DG4S4(L)-016A-(*)-50	213232				

▲INCLUDED IN F3 SEAL KIT 919214

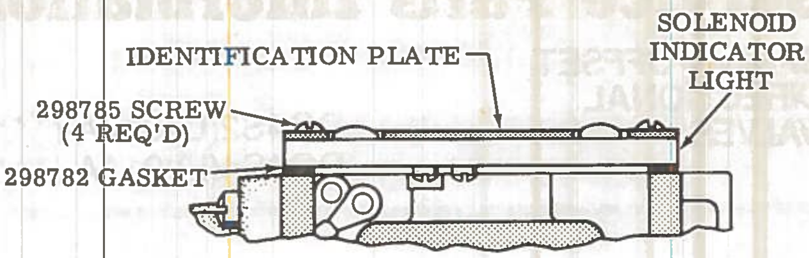
◆NOT AVAILABLE FOR SALE

✱TORQUE TO 30 - 35 lb. in.

SOLENOID INDICATOR LIGHT KITS (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615

NOTE
REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURE.

FOR MODELS WITH SOLENOID INDICATOR LIGHT



50/60 HERTZ SOLENOIDS		
MODEL	SOLENOID S/A	COIL
DG*S4-****-115AC-50/60-50	751137	751057
F3-DG*S4-****-115AC-50/60-50	751407	751406

LEAD WIRE IDENTIFICATION
RED LEAD - COMMON
YELLOW LEAD - 60 Hz.
BLUE LEAD - 50 Hz.

CAUTION
FOR 50 CYCLE OPERATION USE RED AND BLUE LEADS
FOR 60 CYCLE OPERATION USE RED AND YELLOW LEADS
DO NOT USE BLUE AND YELLOW LEADS TOGETHER

MODEL CODE BREAKDOWN

(F3)-D G 4 S*(L)-01*A-(*AC**)-50**

- (F3) — MULTI-FLUID CAPABILITY (VITON SEALS)
- D — DIRECTIONAL VALVES
- G — SUBPLATE OR MANIFOLD MOUNTED
- 4 — SOLENOID OPERATED
- S — SLIDING SPOOL
- * — FLOW DIRECTIONS: 2-2 WAY; 4-4 WAY
- (L) — L - SOLENOID INDICATOR LIGHT; OMITTED - NONE
- 01 — SERIES
- * — SPOOL TYPE
- A — SPRING OFFSET
- (***AC**) — SOLENOID VOLTAGE AND FREQUENCY; OMITTED - 115VAC60 STANDARD
- 50 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

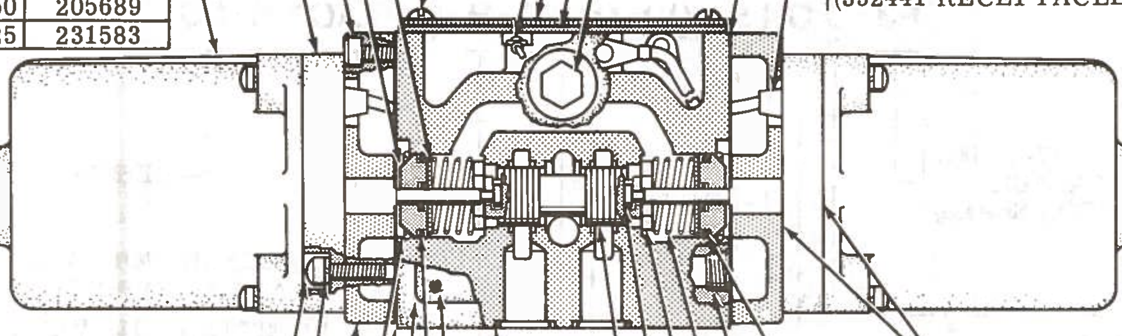
Service Parts Information

VICKERS®
A TRINOVA COMPANY

SPRING CENTERED SOLENOID CONTROLLED DIRECTIONAL VALVES

DG4S4(L)-01*C-H-(***AC***)-50

VOLTAGE	SOLENOID S/A
24 AC 60	251505
110 AC 60	232960
115 AC 60	195053
120 AC 60	240996
215 AC 60	323163
230 AC 60	195054
115 AC 50	205687
120 AC 50	290899
220 AC 50	248640
230 AC 50	205688
240 AC 50	279926
415 AC 50	237544
460 AC 50	205689
110 AC 25	231583

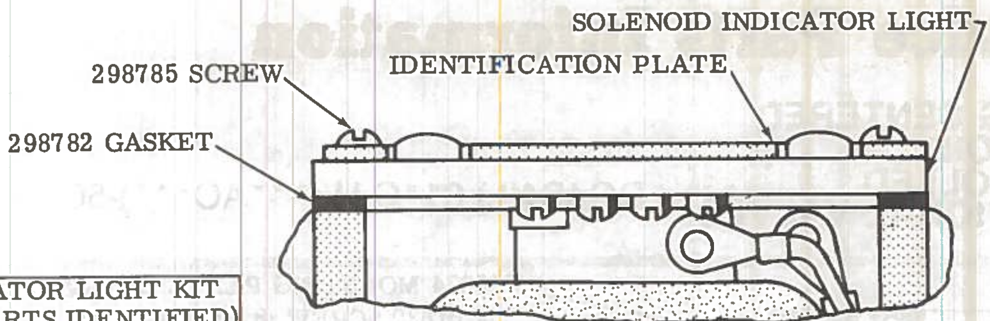


◆NOT AVAILABLE FOR SALE

▲INCLUDED IN F3 919359 SEAL KIT

✱ASSEMBLE ON SPOOL WITH SHARP BREAK EDGE OF WASHER TOWARD SPRING

MODEL	DIAGRAM PLATE	SPOOL	WASHER (2 REQ'D)	SPRING (2 REQ'D)	PUSH PIN (2 REQ'D)
DG4S4-010C-H-(*)-50	290341	213230	211846	290072	289340
DG4S4-012C-H-(*)-50	290343	213231	211846	290072	289340
DG4S4-013C-H-(*)-50	290344	239903	211846	290072	289340
DG4S4-016C-H-(*)-50	290345	213232	211846	290072	289340
DG4S4-017C-H-(*)-50	290346	236624	211846	290072	289340
DG4S4-018C-H-(*)-50	290340	235637	✱283637	217323	290320
DG4S4-0133C-H-(*)-50	577484	236615	211846	290072	289340



SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615

NOTE
REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURE.

MODEL CODE BREAKDOWN

F3-DG4S*(L)-01*C-H-(*AC**)-50**

- F3 — MULTI-FLUID CAPABILITY (VITON SEALS)
- D — DIRECTIONAL VALVE
- G — SUBPLATE MOUNTED
- 4 — SOLENOID OPERATED
- S — SLIDING SPOOL
- * — FLOW DIRECTIONS
  2 - 2 WAY
  4 - 4 WAY
- (L) — L - SOLENOID INDICATOR LIGHT
  OMITTED - NONE
- 01 — SERIES
- * — SPOOL TYPE
- C — SPRING CENTERED
- H — OIL IMMERSED SOLENOID
- (***AC**) — SOLENOID VOLTAGE AND FREQUENCY
  OMITTED - 115 VAC 60 STANDARD
- 50 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

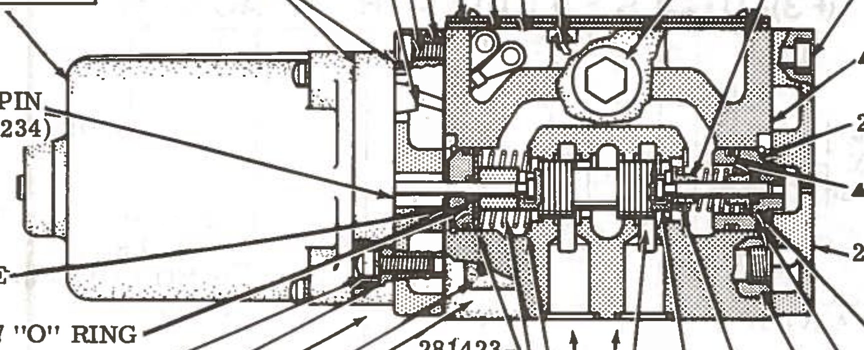
Service Parts Information

VICKERS®
A TRINOVA COMPANY

SPRING OFFSET SOLENOID CONTROLLED DIRECTIONAL VALVES

DG4S*(L)-01*-A-H-(***AC*)-50

VOLTAGE	SOLENOID S/A
24 AC 60	251505
110 AC 60	232960
115 AC 60	195053
120 AC 60	240996
215 AC 60	323163
230 AC 60	195054
115 AC 50	205687
120 AC 50	290899
220 AC 50	248640
230 AC 50	205688
240 AC 50	279926
415 AC 50	237544
460 AC 50	205689
230 AC 25	224624



MODEL	DIAGRAM PLATE RH	DIAGRAM PLATE LH
DG4S2(L)-	290347	577488
DG4S4(L)-	290348	577490

MODEL	SPOOL	PUSH PIN	LIMITER (2 REQ'D)	GUIDE	"O"RING
DG4S2(L)-012A-H-(*)-50	220344	——	——	281424	——
DG4S4(L)-010A-H-(*)-50	213230	220234	294226	284931	▲262327
DG4S4(L)-012A-H-(*)-50	213231				
DG4S4(L)-016A-H-(*)-50	213232				

RIGHT HAND ASSEMBLY SHOWN. IN LEFT HAND ASSEMBLY ALL PARTS OF VALVE EXCEPT BODY ARE REVERSED. EXAMPLE OF L.H. MODEL: DG4S4-012A-H-50-LH

▲INCLUDED IN F3 SEAL KIT 919359

◆NOT AVAILABLE FOR SALE

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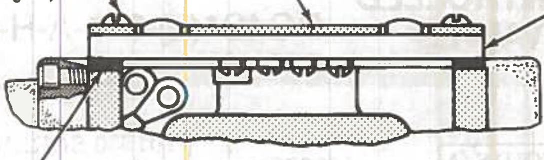
P.O. Box 302
Troy, Michigan 48007-0302

SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615

FOR MODELS WITH SOLENOID INDICATOR LIGHT



NOTE
REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURE.

MODEL CODE BREAKDOWN

(F3)-DG4S*(L)-01*A-H-(*AC*)-50**

- (F3) — MULTI-FLUID CAPABILITY (VITON SEALS)
- D — DIRECTIONAL VALVES
- G — SUBPLATE OR MANIFOLD MOUNTED
- 4 — SOLENOID OPERATED
- S — SLIDING SPOOL
- * — FLOW DIRECTIONS 2-2 WAY 4-4 WAY
- (L) — L - SOLENOID INDICATOR LIGHT; OMITTED - NONE
- 01 — SERIES
- * — SPOOL TYPE
- A — SPRING OFFSET
- H — OIL IMMERSED SOLENOID
- (***AC*) — SOLENOID VOLTAGE AND FREQUENCY OMITTED-115AC60 STANDARD.
- 50 — DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

VICKERS®
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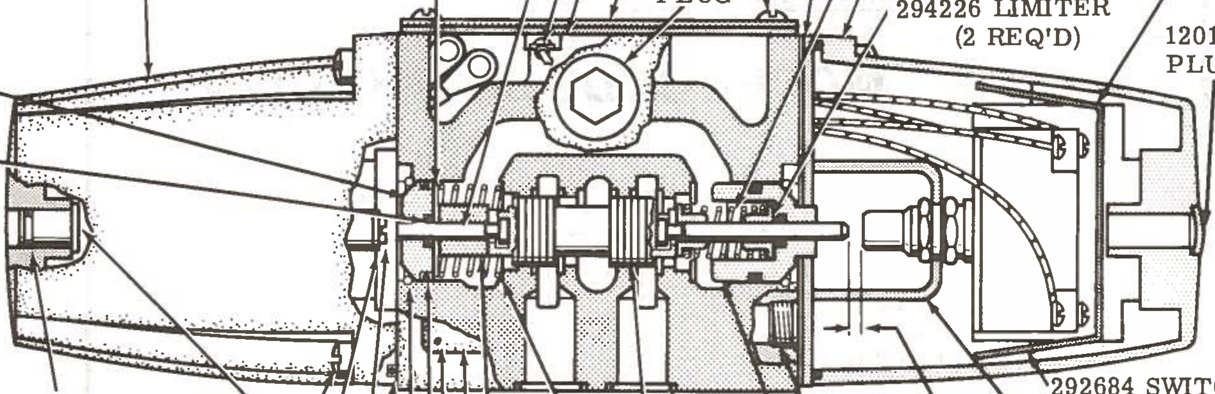
DIRECTIONAL VALVE WITH LIMIT SWITCH

SDG4S*(L)-01*A-50

FOR ADDITIONAL SOLENOID S/A SEE I-3544-S

NOTE
FOR 50/60 CYCLE HERTZ SOLENOIDS SEE BACK PAGE

VOLTAGE	SOLENOID S/A	COIL S/A	SOLENOID S/A F3	COIL S/A F3
115 AC 60	281291	316011	317767	317768
230 AC 60	281292	298721	317769	317770
460 AC 60	281293	298722	317771	317772



MODEL	SPOOL
SDG4S2(L)-012A-(*)-50	238966
SDG4S4(L)-010A-(*)-50	213230
SDG4S4(L)-012A-(*)-50	213231

✱TORQUE TO 30-35 lb. in.

▲INCLUDED IN F3 SEAL KIT 919214

MODEL	DIAGRAM PLATE	
	RH	LH
DG4S2(L)	290347	577488
DG4S4(L)	290348	577490

RIGHT HAND ASSEMBLY SHOWN. IN LEFT HAND ASSEMBLY ALL PARTS OF VALVE EXCEPT BODY ARE REVERSED. EXAMPLE OF L.H. MODEL: SDG4S2*-012A-50-LH

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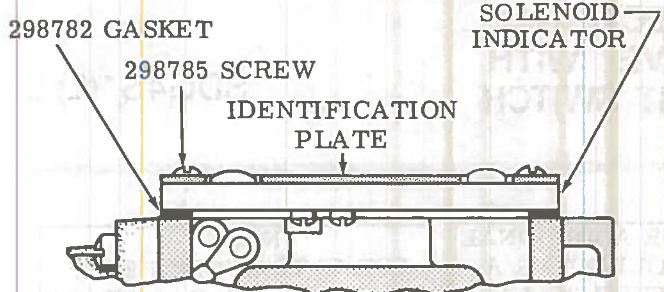
SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615

NOTE
REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURE.

FOR MODELS WITH SOLENOID INDICATOR LIGHT



50/60 HERTZ SOLENOIDS		
MODEL	SOLENOID S/A	COIL
SDG*S4-****-115AC-50/60-50	751137	751057
F3-SDG*S4-****-115AC-50/60-50	751407	751406

LEAD WIRE IDENTIFICATION
RED LEAD - COMMON
YELLOW LEAD - 60 Hz.
BLUE LEAD - 50 Hz.

CAUTION
FOR 50 CYCLE OPERATION USE RED AND BLUE LEADS
FOR 60 CYCLE OPERATION USE RED AND YELLOW LEADS
DO NOT USE BLUE AND YELLOW LEADS TOGETHER.

MODEL CODE BREAKDOWN

(F3)-S D G 4 S*(L)-01*A-50

- (F3) — MULTI-FLUID CAPABILITY (VITON SEALS)
- S — LIMIT SWITCH
- D — DIRECTIONAL VALVE
- G — GASKET MOUNTED
- 4 — SOLENOID OPERATED
- S — SLIDING SPOOL
- * — FLOW DIRECTIONS :
  - 2 - TWO WAY
  - 4 - FOUR WAY
- (L) — L - SOLENOID INDICATOR LIGHT; OMITTED - NONE
- 0 — SERIES 10
- 1 — SPOOL TYPE
- * — SPRING OFFSET
- A — DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

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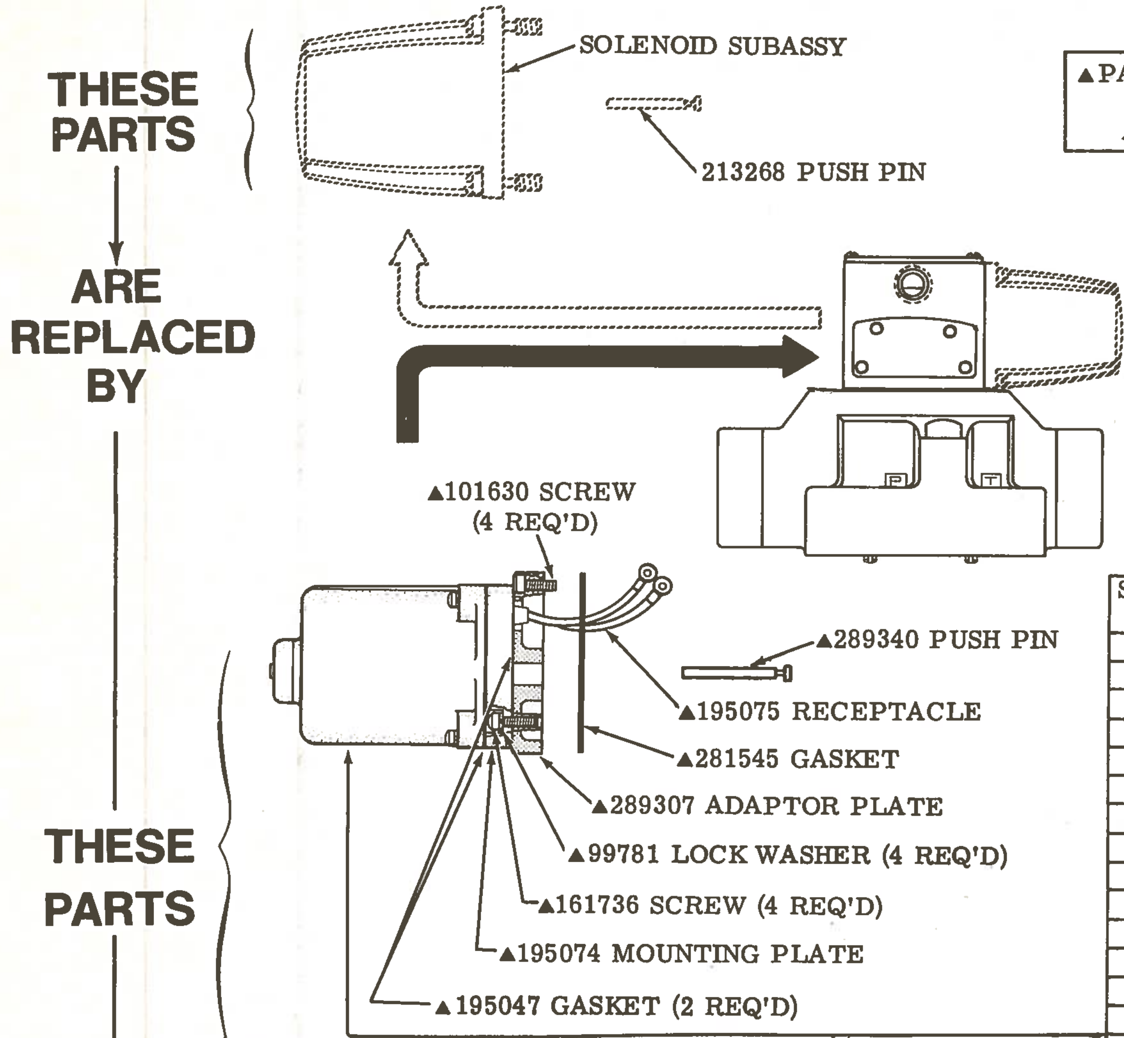
DIRECTIONAL VALVES WITH OIL IMMERSED SOLENOIDS



▲PARTS INCLUDED IN 941769 ADAPTER KIT

THE SAME CHANGE APPLIES TO THIS END FOR MODELS WITH TWO SOLENOIDS

SOLENOID S/A	VOLTAGE
251505	24 AC 60
232960	110 AC 60
195053	115 AC 60
240996	120 AC 60
323163	215 AC 60
195054	230 AC 60
205687	115 AC 50
290899	120 AC 50
248640	220 AC 50
205688	230 AC 50
279926	240 AC 50
237544	415 AC 50
205689	460 AC 50
231583	110 AC 25

ON MODEL	SHOWN ON DRAWING -50 DESIGN	SHOWN ON DRAWING -51 DESIGN	SHOWN ON DRAWING -53 DESIGN	TO MAKE MODEL
DF5S4(L)-16*A-50/53	I-3486-S		I-3622-S	DF5S4(L)-16*A-H-50/53
DF5S4(L)-16*B-53			I-3622-S	DF5S4(L)-16*B-H-53
DF5S4(L)-16*C-50/51/53	I-3482-S		I-3622-S	DF5S4(L)-16*C-H-50/51/53
DF5S4(L)-16*N-50/51/53	I-3482-S	I-3482-S	I-3622-S	DG5S4(L)-16*N-H-50/51/53
DG5S4(L)-06*A-50/51	I-3492-S	I-3502-S		DG5S4(L)-06*A-H-50/51
DG5S4(L)-06*C-50/51	I-3490-S	I-3473-S		DG5S4(L)-06*C-H-50/51
DG5S4(L)-06*D-50/51	I-3493-S	I-3504-S		DG5S4(L)-06*D-H-50/51
DG5S4(L)-06*N-50/51	I-3491-S	I-3474-S		DG5S4(L)-06*N-H-50/51
DG5S4(L)-10*A-50/51/53	I-3496-S	I-3513-S	I-3624-S	DG5S4(L)-10*A-H-50/51/53
DG5S4(L)-10*B-53			I-3624-S	DG5S4(L)-10*B-H-53
DG5S4(L)-10*C-50/51/53	I-3494-S	I-3509-S	I-3624-S	DG5S4(L)-10*C-H-50/51/53
DG5S4(L)-10*D-50/51/53	I-3497-S	I-3514-S	I-3625-S	DG5S4(L)-10*D-H-50/51/53
DG5S4(L)-10*N-50/51/53	I-3495-S	I-3512-S	I-3624-S	DG5S4(L)-10*N-H-50/51/53

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MODEL CODE BREAKDOWN

(F3)-D*5S4(L)-**(X)(*)-(*)-(E)-(T)-(*)-H-(***AC**)-5***

- (F3) — MULTI-FLUID CAPABILITY VITON SEALS
- D — DIRECTIONAL VALVE
- * — F - FLANGE CONNECTION; G - SUBPLATE OR MANIFOLD MOUNTED
- 5 — SOLENOID CONTROLLED PILOT OPERATED
- S — SLIDING SPOOL
- 4 — FLOW DIRECTIONS: 4 - 4 WAY
- (L) — L - SOLENOID INDICATOR LIGHTS; OMITTED - NONE
- ** — 06 - SERIES 60; 10 - SERIES 100; 16 - SERIES 160
- * — TYPE OF MAIN STAGE SPOOL
- * —
  - A - SPRING OFFSET
  - B - SPRING CENTERED (ONE SOLENOID)
  - C - SPRING CENTERED
  - D - PRESSURE CENTERED
  - N - NO SPRING DETENTED
- (X) — "X" - FAST RESPONSE MODELS (FOR 100 SERIES PRESSURE CENTERED MODELS, "X" IS AVAILABLE IN THE "A" PILOT PRESSURE RANGE ONLY); OMITTED - LOW SHOCK MODEL
- (*) — PILOT PRESSURE RANGE (100 SERIES "D" PRESSURE CENTERED MODELS ONLY)
  - OMITTED - 2000 TO 3000 PSI
  - A - 300 TO 1000 PSI
  - B - 1000 TO 2000 PSI
- (*) — SPOOL CONTROL MODIFICATIONS (OMIT IF NOT REQUIRED)
  - 1 - STROKE ADJUSTMENTS
  - 2 - PILOT CHOKE
  - 3 - PILOT CHOKE & STROKE ADJ.
  - 7 - STROKE ADJ. "A" END ONLY
  - 8 - STROKE ADJ. "B" END ONLY
- (E) — E - EXTERNAL PILOT PRESSURE; OMITTED - INTERNAL PILOT PRESSURE
- (T) — T - INTERNAL PILOT DRAIN (NOT AVAILABLE ON OPEN CENTER SPOOLS UNLESS EXTERNAL PILOT PRESSURE "E" IS USED); OMITTED - EXTERNAL PILOT DRAIN
- (*) — CHECK VALVE
  - OMITTED - NO CHECK VALVE
  - K - 5 PSI CRACKING PRESSURE
  - L - 30 PSI CRACKING PRESSURE
  - R - 50 PSI CRACKING PRESSURE
  - S - 75 PSI CRACKING PRESSURE
- H — OIL IMMERSED SOLENOID
- (***AC**) — VOLTAGE & FREQUENCY; OMITTED - 115AC60 STD.
- 5* — DESIGN -50/-51/-53

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

Service Parts Information

VICKERS®
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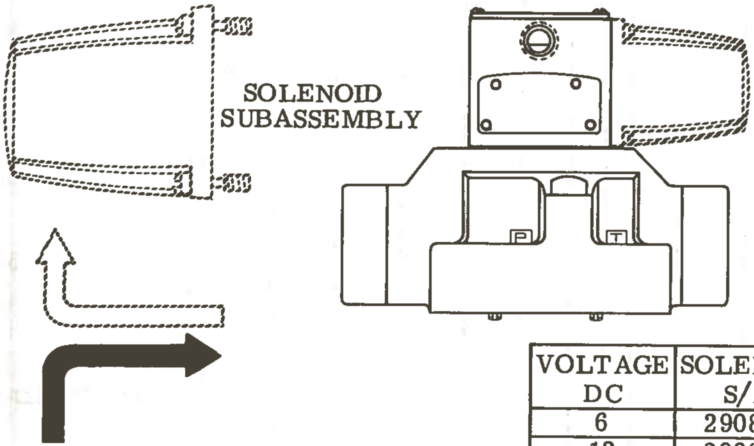
DIRECTIONAL VALVES WITH DIRECT CURRENT SOLENOIDS

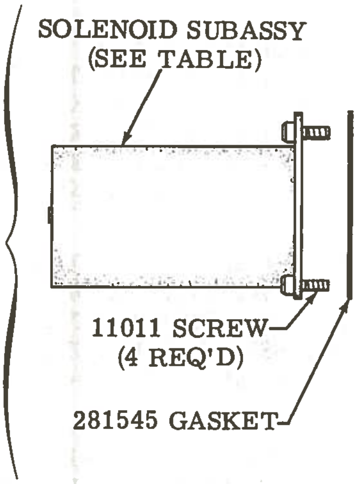
THIS PART



THE SAME CHANGE APPLIES TO THIS END FOR MODELS WITH TWO SOLENOIDS

IS REPLACED BY

THESE PARTS



VOLTAGE DC	SOLENOID S/A	COIL	F3 S/A SOLENOID	F3 COIL
6	290838	291582	—	—
12	290839	291583	751283	751284
24	290840	291584	393091	393090
28	320223	320224		
30	320227	320228		
32	323224	323225	—	—
36	326039	326311		
40	392502	392503		
48	324739	324740	585214	585215
50	385683	385684		
60	320641	320642		
72	326043	326315	—	—
90	326038	326310		
110	320218	320219	750463	750464
115	321986	321987	—	—
120	326041	326313		
125	318717	318718	751264	751265
130	326042	326314	—	—
220	326040	326312	751270	751276
230	318392	318393	751266	751267
240	326044	326316	751268	751269
250	306083	306084	751272	751273

ON MODEL	SHOWN ON DRAWING			TO MAKE MODEL
	-50	-51	-53/-54	
DF5S4-16*A-50/53	I-3486-S			DF5S4-16*A-*DC-50/53
DF5S4-16*B-53	—	—	I-3622-S	DF5S4-16*B-*DC-53
DF5S4-16*C-50/53	I-3482-S			DF5S4-16*C-*DC-50/53
DF5S4-16*N-50/51/53		I-3482-S		DF5S4-16*N-*DC-50/51/53
DG5S4-06*A-50/51	I-3492-S	I-3502-S		DG5S4-16*A-*DC-50/51
DG5S4-06*C-50/51	I-3490-S	I-3473-S		DG5S4-06*C-*DC-50/51
DG5S4-06*D-50/51	I-3493-S	I-3504-S	—	DG5S4-06*D-*DC-50/51
DG5S4-06*N-50/51	I-3491-S	I-3474-S		DG5S4-06*N-*DC-50/51
DG5S4-10*A-50/51/53/54	I-3496-S	I-3513-S		DG5S4-10*A-*DC-50/51/53/54
DG5S4-10*B-53/54	—	—	I-3624-S	DG5S4-10*B-*DC-53/54
DG5S4-10*C-50/51/53/54	I-3494-S	I-3509-S		DG5S4-10*C-*DC-50/51/53/54
DG5S4-10*D-50/51/53/54	I-3497-S	I-3514-S	I-3625-S	DG5S4-10*D-*DC-50/51/53/54
DG5S4-10*N-50/51/53/54	I-3495-S	I-3512-S	I-3624-S	DG5S4-10*N-*DC-50/51/53/54

MODEL CODE BREAKDOWN

D*5 S 4(L)- ** * *(X)(*)-(*)-(E)-(T)-(*)-*DC- 5*

- DIRECTIONAL VALVE
- F - FLANGE CONNECTION
  G - SUBPLATE OR MANIFOLD MOUNTED
- SOLENOID CONTROLLED PILOT OPERATED
- SLIDING SPOOL
- FLOW DIRECTIONS
  4 - 4 WAY
- L - SOLENOID INDICATOR LIGHTS
  OMITTED - NONE
- 06 - SERIES 60
  10 - SERIES 100
  16 - SERIES 160
- TYPE OF MAIN STAGE SPOOL
- A - SPRING OFFSET
  C - SPRING CENTERED
  D - PRESSURE CENTERED
  N - NO-SPRING DETENTED
- "X" - FAST RESPONSE MODELS (FOR 100 SERIES PRESSURE CENTERED MODELS, "X" IS AVAILABLE IN THE "A" PILOT PRESSURE RANGE ONLY)
  OMITTED - LOW SHOCK MODEL
- PILOT PRESSURE RANGE (100 SERIES PRESSURE CENTERED MODELS ONLY)
  A - 300 TO 1000 PSI
  B - 1000 TO 2000 PSI
- SPOOL CONTROL MODIFICATIONS (OMIT IF NOT REQUIRED)
  1 - STROKE ADJUSTMENTS
  2 - PILOT CHOKE
  3 - PILOT CHOKE AND STROKE ADJUSTMENT
  7 - STROKE ADJUSTMENT "A" END ONLY
  8 - STROKE ADJUSTMENT "B" END ONLY
- E - EXTERNAL PILOT PRESSURE
  OMITTED-INTERNAL PILOT PRESSURE
- T - INTERNAL PILOT DRAIN (NOT AVAILABLE ON OPEN CENTER SPOOLS UNLESS EXTERNAL PILOT PRESSURE (E) IS USED)
  OMITTED-EXTERNAL PILOT DRAIN
- CHECK VALVE
  OMITTED-NO CHECK VALVE
  K- 5 PSI CRACKING PRESSURE
  L-30 PSI CRACKING PRESSURE
  R-50 PSI CRACKING PRESSURE
  S-75 PSI CRACKING PRESSURE
- DC SOLENOID
- SOLENOID VOLTAGE
- DESIGN
  -50/-51/-53/-54

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

Service Parts Information

VICKERS®
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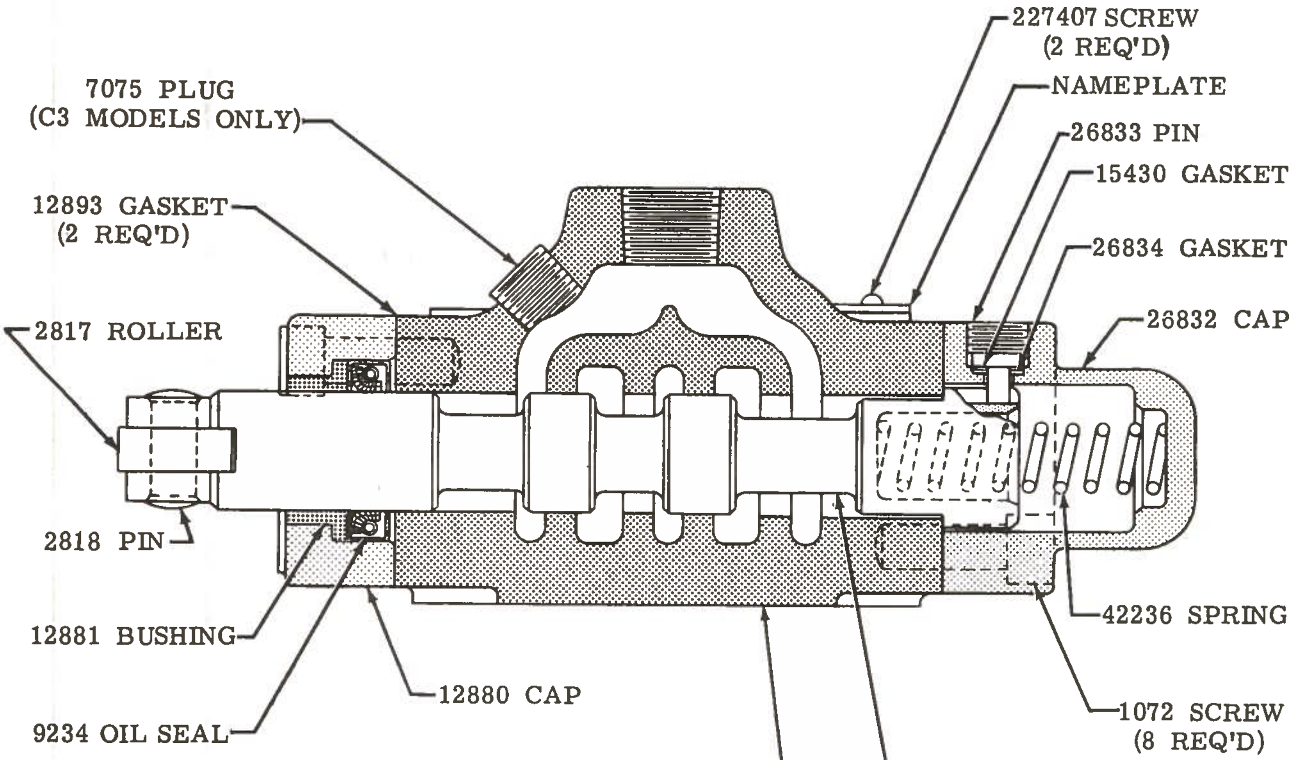
ROLLER OPERATED DIRECTIONAL VALVES



MODEL NO.	PORT SIZE	BODY	SPOOL
C2-476-EA	3/8	10200	29948
C2-478-EA			29946
C2-478-EA-S1			63570
C3-430-EA	3/4	298-X	29940
C3-430-EA-S1			60524
C3-430-EA-S2			44450
C3-432-EA			29941
C3-432-EA-S4			30850

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

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1401 Crooks Road
Troy, Michigan 48084

Revised 1-1-88 I-975-S

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Service Parts Information

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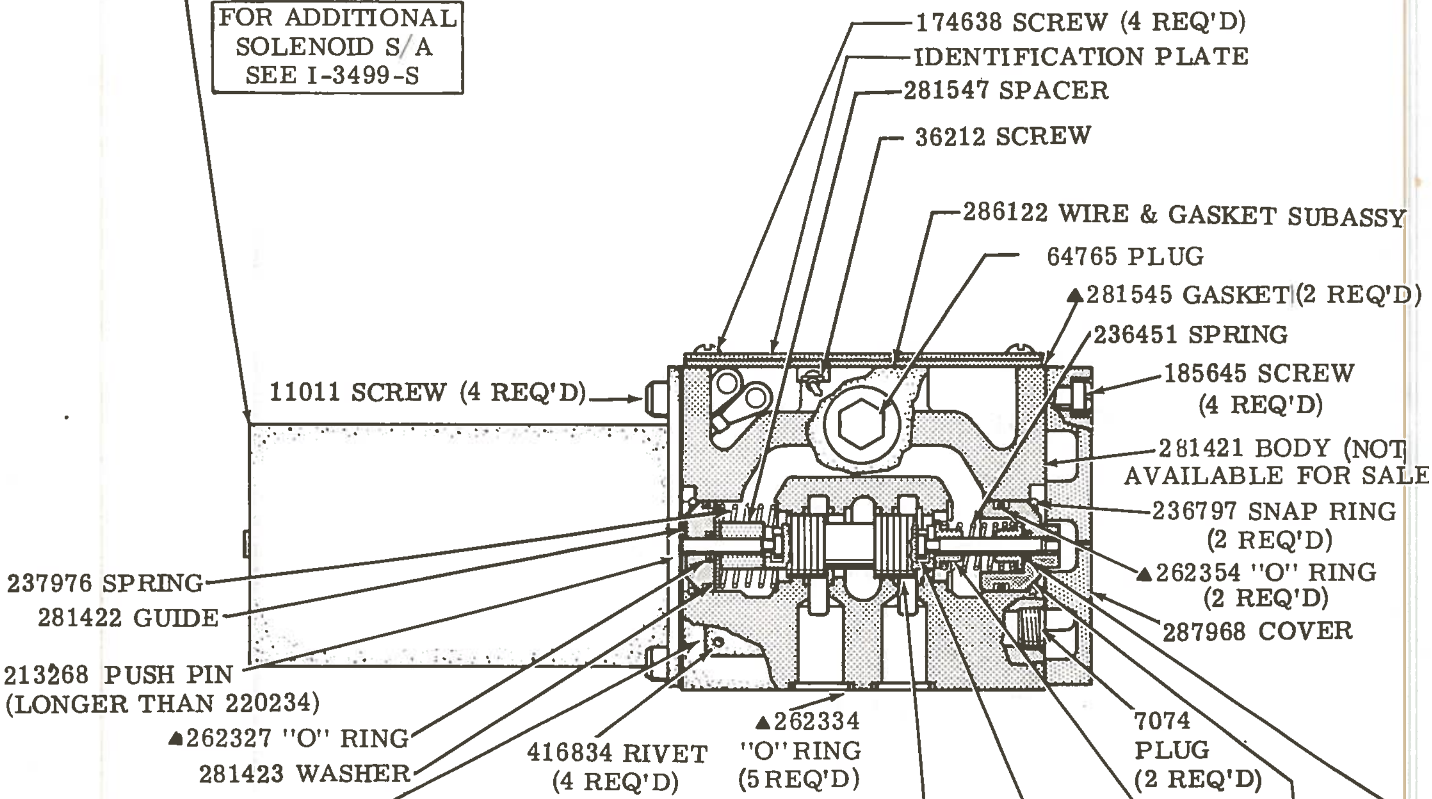
SPRING OFFSET SOLENOID CONTROLLED DIRECTIONAL VALVES

DG4S2-012A-*DC-50
DG4S4-01*A-*DC-50

VOLTAGE DC	SOLENOID S/A (2 REQ'D)	COIL S/A (2 REQ'D)	SOLENOID S/A F3 (2 REQ'D)	COIL S/A F3 (2 REQ'D)
12	290839	291583	751283	751284
24	290840	291584	393091	393090

FOR ADDITIONAL SOLENOID S/A SEE I-3499-S



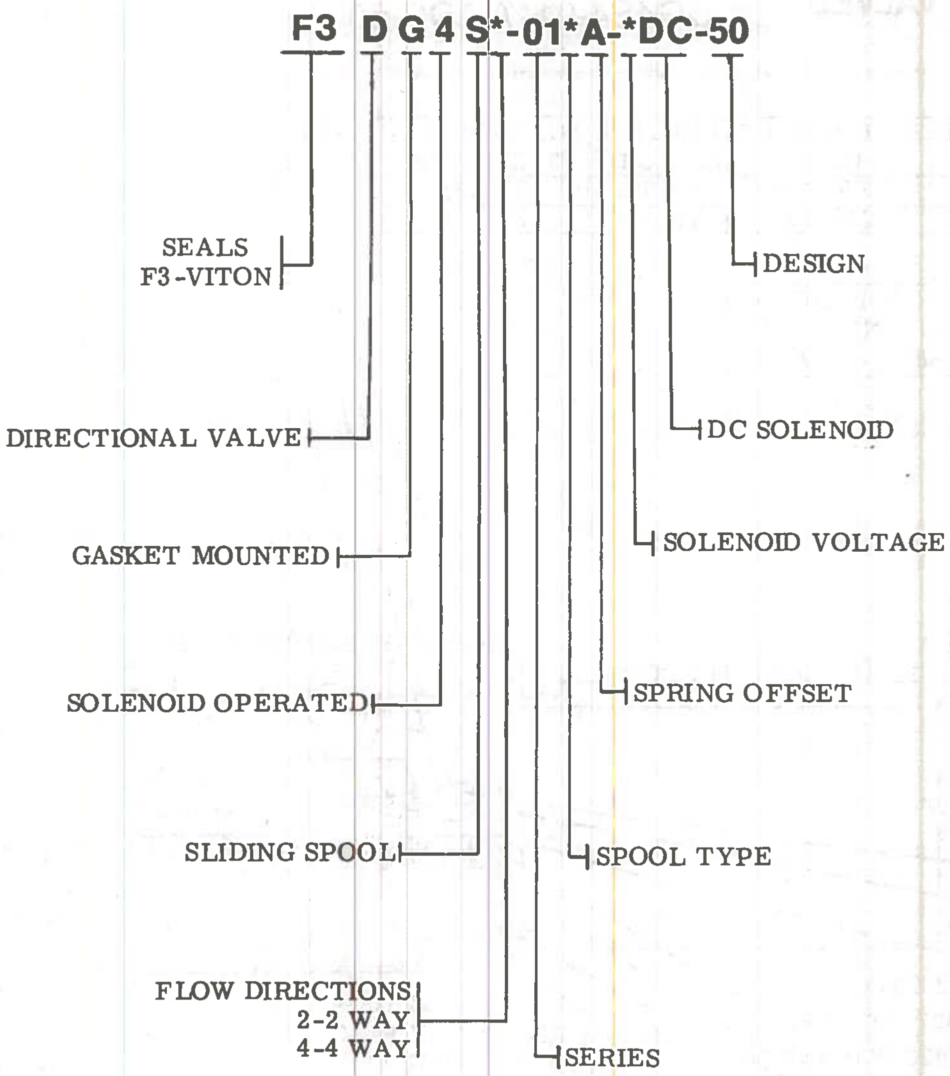
MODEL	DIAGRAM PLATE	
	RH	LH
DG4S2(L)-	290347	577488
DG4S4(L)-	290348	577490

MODEL	SPOOL	PUSH PIN	LIMITER (2 REQ'D)	GUIDE	▲"O" RING
DG4S2-012A-*DC-50	220344	———	———	281424	———
DG4S4-010A-*DC-50	213230	220234	294226	284931	26232
DG4S4-012A-*DC-50	213231				
DG4S4-016A-*DC-50	213232				

RIGHT HAND ASSEMBLY SHOWN. IN LEFT HAND ASSEMBLY ALL PARTS OF VALVE EXCEPT BODY ARE REVERSED. EXAMPLE OF L.H. MODEL:
DG4S4-012A-*DC-50-LH

▲INCLUDED IN F3 SEAL KIT 919359

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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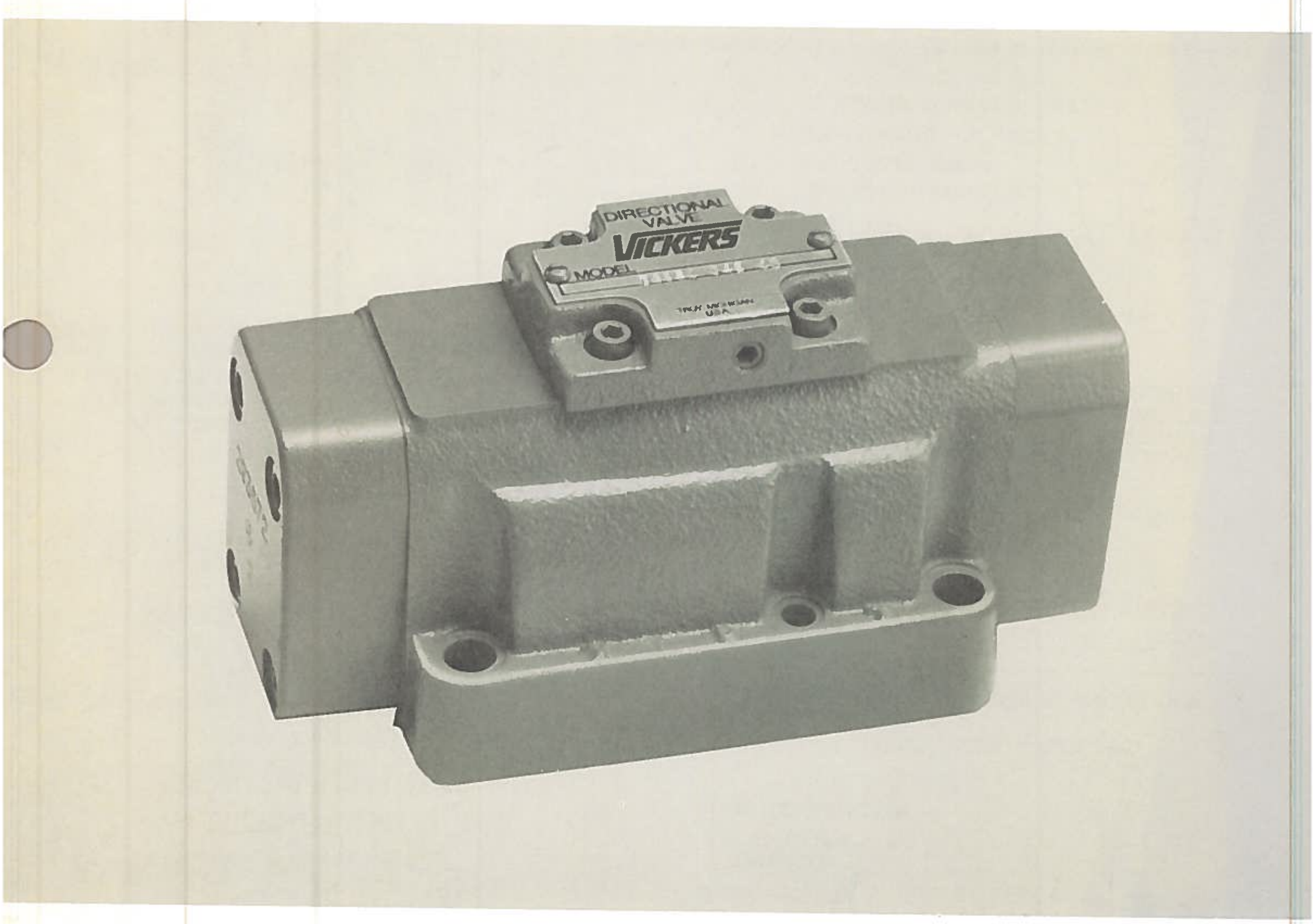
Service Parts Information

Pilot Operated Directional Valve

DG3S4-04*(*)-(*)-40



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Troy, Michigan 48007–0302

Revised 12-1-85

I-3549-S

95

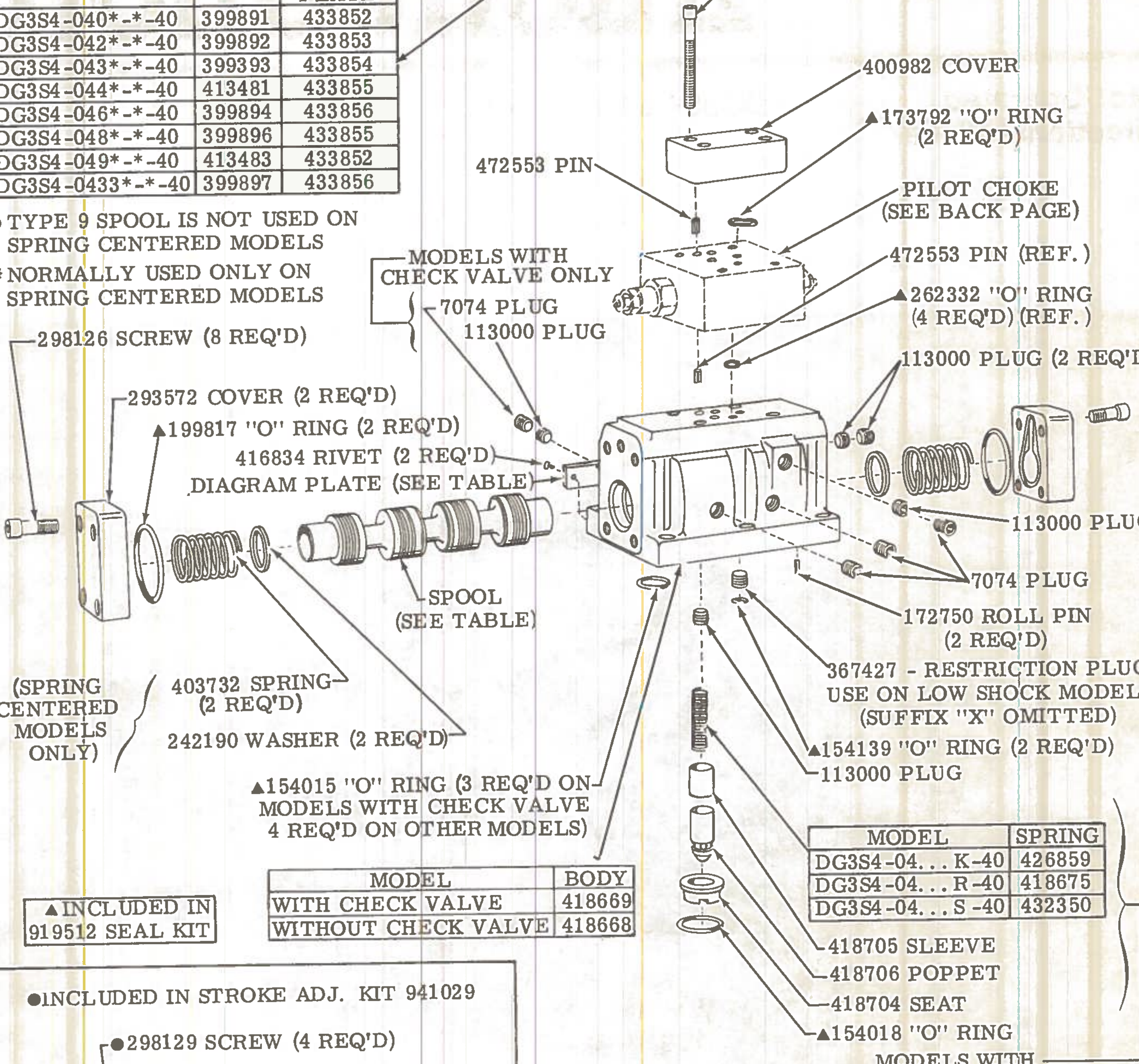
SPRING CENTERED MODEL & NO-SPRING MODEL

MODEL	SPOOL	DIAGRAM PLATE
DG3S4-040*-*-40	399891	433852
DG3S4-042*-*-40	399892	433853
✱DG3S4-043*-*-40	399393	433854
✱DG3S4-044*-*-40	413481	433855
DG3S4-046*-*-40	399894	433856
✱DG3S4-048*-*-40	399896	433855
●DG3S4-049*-*-40	413483	433852
✱DG3S4-0433*-*-40	399897	433856

● TYPE 9 SPOOL IS NOT USED ON SPRING CENTERED MODELS

✱ NORMALLY USED ONLY ON SPRING CENTERED MODELS

SCREW (4 REQ'D)	MODEL
189128	WITH PILOT CHOKE
8077	WITHOUT PILOT CHOKE
TORQUE TO 50 lb. in. MAXIMUM	

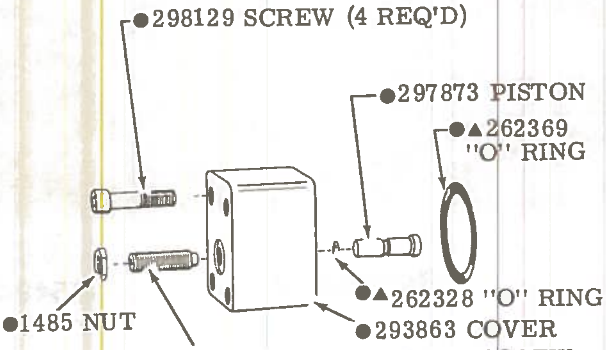


MODEL	SPRING
DG3S4-04. . . K-40	426859
DG3S4-04. . . R-40	418675
DG3S4-04. . . S-40	432350

MODEL	BODY
WITH CHECK VALVE	418669
WITHOUT CHECK VALVE	418668

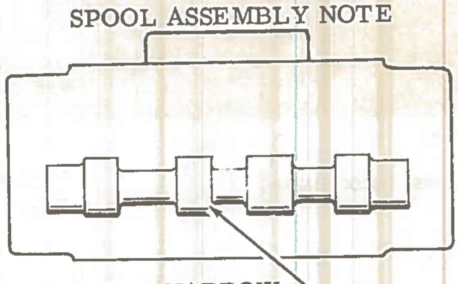
▲INCLUDED IN 919512 SEAL KIT

●INCLUDED IN STROKE ADJ. KIT 941029



STROKE ADJUSTMENT PARTS (EITHER END OR BOTH)

SPOOL ASSEMBLY NOTE

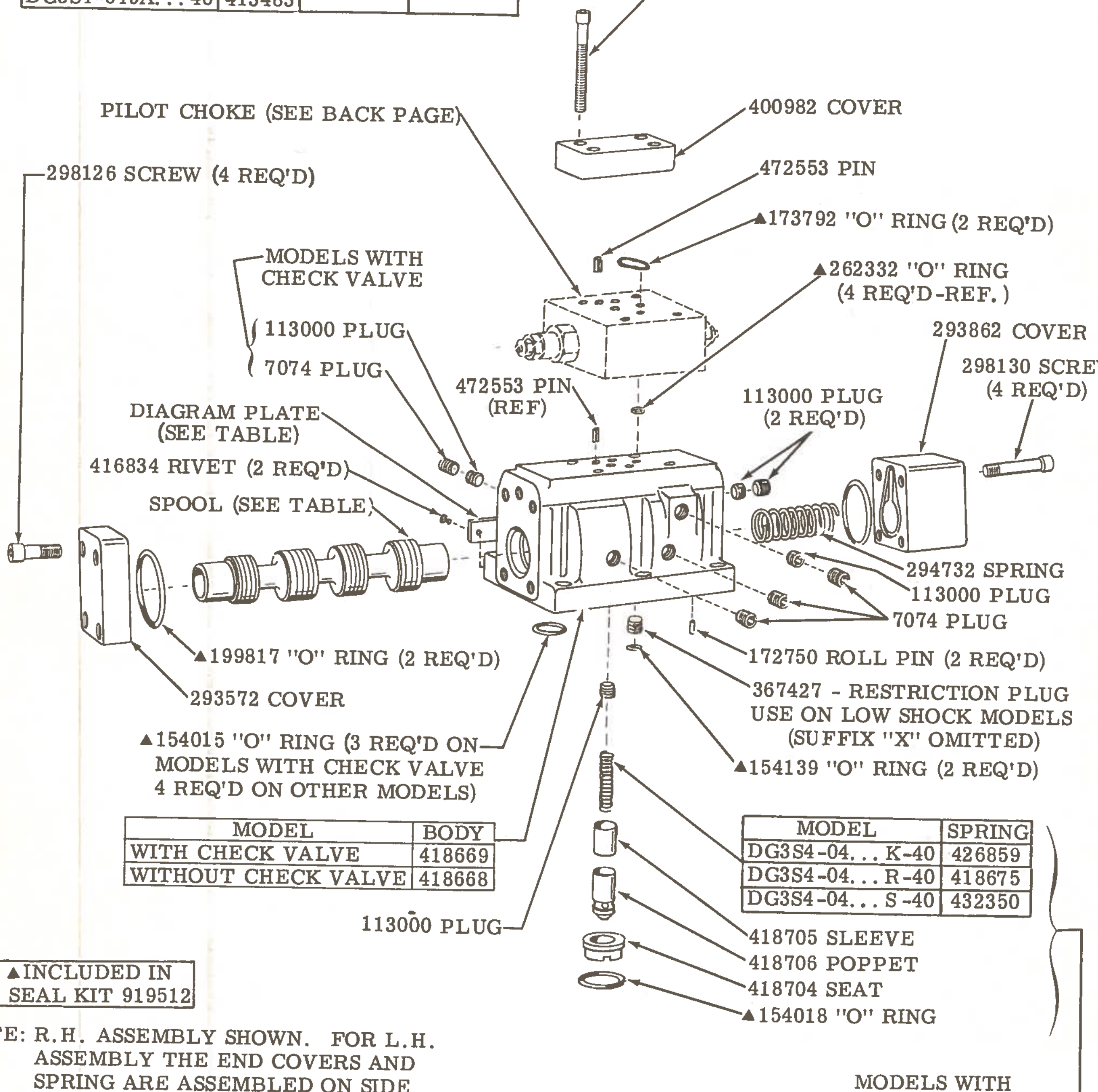


ASSEMBLE TYPE 3 SPOOL WITH NARROW LAND TOWARD "A" END OF UNIT.

SPRING OFFSET MODEL

MODEL	SPOOL	DIAGRAM PLATE	
		R. H.	L. H.
DG3S4-040A. . . 40	399891	433857	434314
DG3S4-042A. . . 40	413482		
DG3S4-046A. . . 40	399894		
DG3S4-049A. . . 40	413483		

SCREW (4 REQ'D)	MODEL
189128	WITH PILOT CHOKE
8077	WITHOUT PILOT CHOKE
TORQUE TO 50 lb. in. MAXIMUM	



MODEL	BODY
WITH CHECK VALVE	418669
WITHOUT CHECK VALVE	418668

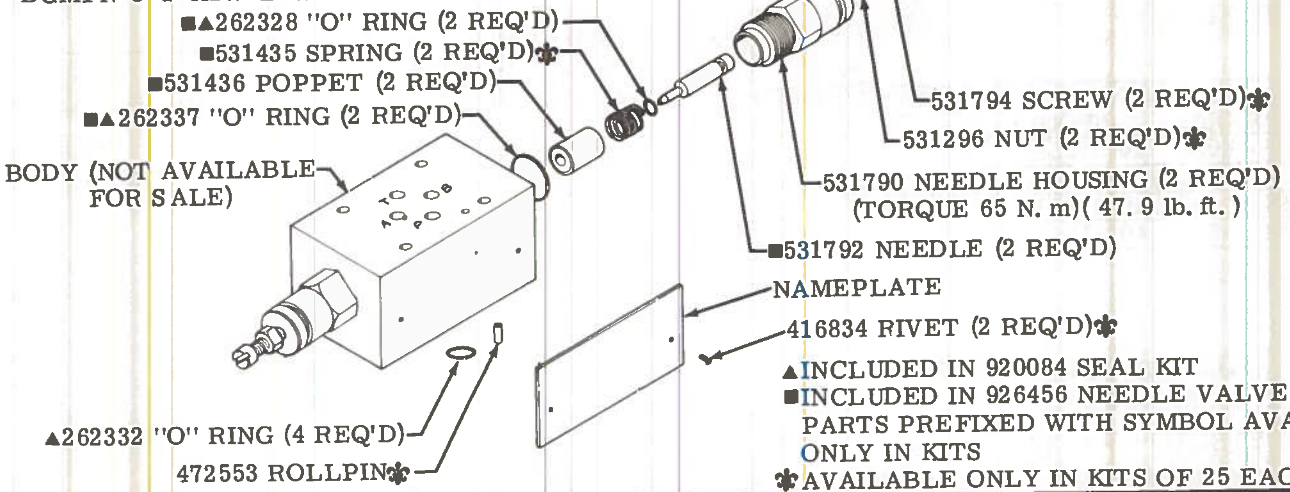
MODEL	SPRING
DG3S4-04. . . K-40	426859
DG3S4-04. . . R-40	418675
DG3S4-04. . . S -40	432350

▲INCLUDED IN SEAL KIT 919512

NOTE: R.H. ASSEMBLY SHOWN. FOR L.H. ASSEMBLY THE END COVERS AND SPRING ARE ASSEMBLED ON SIDE OPPOSITE OF THAT SHOWN. FOR STROKE ADJUST PARTS SEE OTHER PAGE.

STROKE ADJUST COVER PARTS ARE SHOWN ON OTHER PAGE.

PILOT CHOKE
DGMFN-3-Y-A2W-B2W-21



▲INCLUDED IN 920084 SEAL KIT
■INCLUDED IN 926456 NEEDLE VALVE KIT
PARTS PREFIXED WITH SYMBOL AVAILABLE ONLY IN KITS
⚜AVAILABLE ONLY IN KITS OF 25 EACH

MODEL CODE BREAKDOWN

(F3) - D G 3 S 4 - 04 * (*) (*) - (*) - R - 40 - (LH)

- (F3) — SPECIAL SEALS
- D — DIRECTIONAL CONTROL VALVE
- G — SUBPLATE OR MANIFOLD MOUNTED
- 3 — PILOT OPERATED
- S — SLIDING SPOOL
- 4 — 4 FLOW DIRECTIONS
- 04 — VALVE SIZE 04 - 1/2"
- * — SPOOL TYPE
- (*) — OMITTED-NO SPRING; A-SPRING OFFSET; C-SPRING CENTERED
- (*) — "X"- FAST RESPONSE; OMIT FOR STANDARD LOW SHOCK MODELS
- (*) —
  - 1 - STROKE ADJUSTMENTS
  - 2 - PILOT CHOKE ADJUSTMENTS
  - 3 - PILOT CHOKE AND STROKE ADJ.
  - 7 - STROKE ADJ. "A" END ONLY
  - 8 - STROKE ADJ. "B" END ONLY
  - (OMIT WHEN NOT REQUIRED)
- R —
  - K - 5 PSI CHECK
  - R - 50 PSI CHECK
  - S - 75 PSI CHECK
  - (OMIT WHEN NOT REQ'D)
- 40 — DESIGN NUMBER
- (LH) — SPRING OFFSET MODEL OFFSET TO "B" (OMIT FOR OFFSET TO "A" MODELS SHOWN)

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

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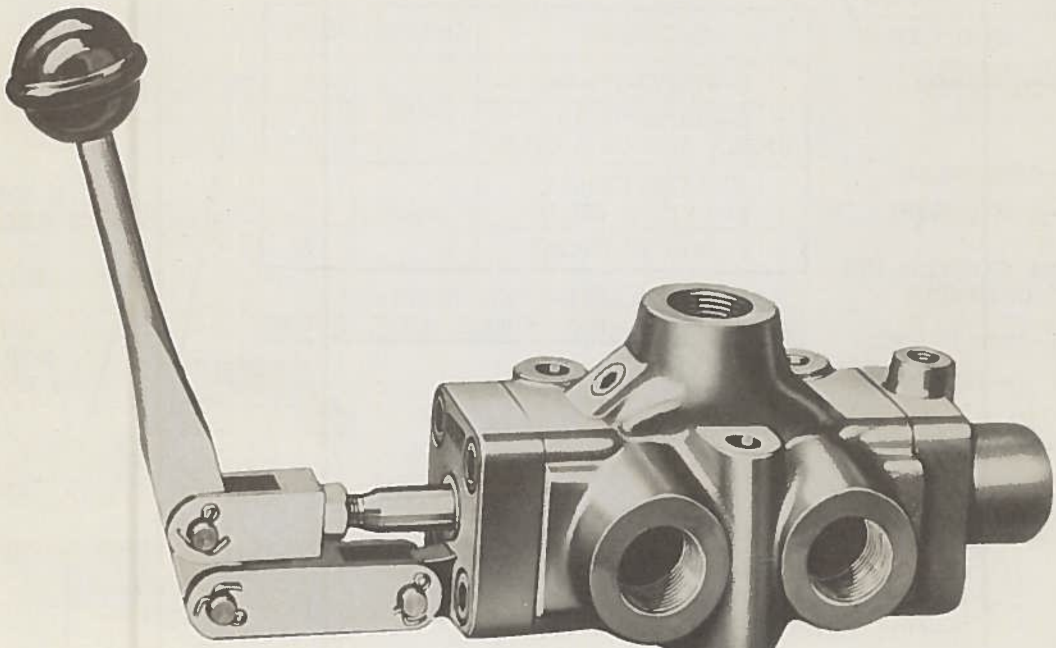
Service Parts Information

Manual Four-Way Directional Valves

C-430/32/34/76/78-(*)-(*)-(S*)
C-1410/12/30/32/34/50/52/54-(*)-(*)-(S*)
C2-1434-1454-(*)-(*)



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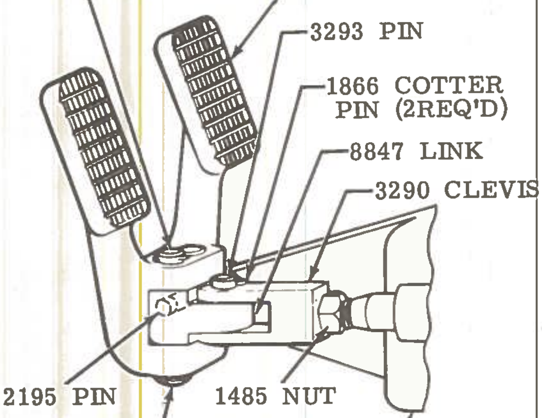
Revised 11-1-85

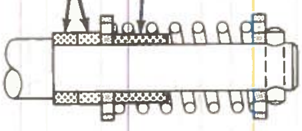
I-3553-S

C-430, C-432, C-476, C-478, C-1410, C-1412

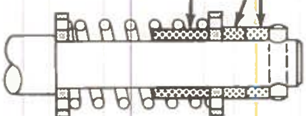
MODEL	SLEEVE	SPRING
C- 430/32-(*)-NS	49204	21982
C- 476/78-(*)-NS	20079	
C-1410/12-(*)-NS	21567	2954



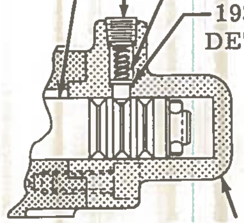
SUFFIX "F" MODELS



SUFFIX "A" MODELS

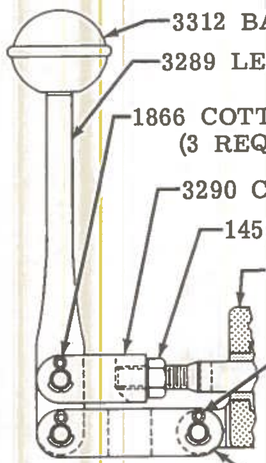


SUFFIX "B" MODELS



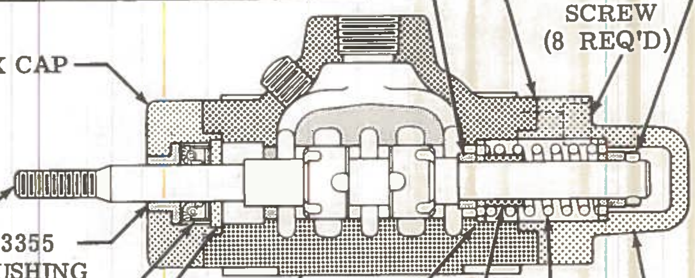
SUFFIX "NS" MODELS

MODELS	SPACER	QTY.
C-476/78-(*)-NS	2402	1
C-430/32/76/78 BASIC, SUFFIX A OR B		2
C-1410, C-1412 SUFFIX A OR B	8947	2
C-1410/12 BASIC		3



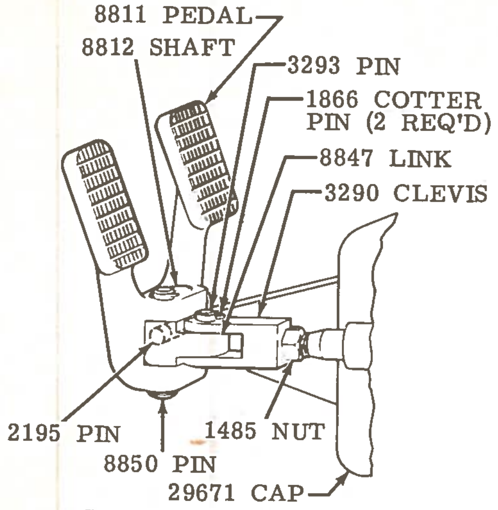
SUFFIX "C" MODELS

BASIC MODEL-STEM CONTROL SPRING CENTERED SPOOL ASSY. SHOWN

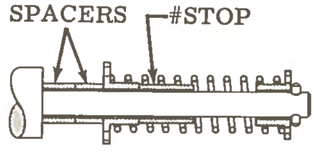


MODEL	VALVE SPOOL BASIC	S1	S2	S3	S4	WASHER	BODY	NOT USED ON "NS" MODELS: WASHER	#STOP	SPRING	CAP
C-430	11590	10217	27826	—	—	10670	332-X	335-X (2) REQ'D	—	2271	333-X
C-432	929-X	—	—	15250	32031						
C-476	1897-X	—	—	10369	2171-X		2155-X			177640	
C-478	1737-X	33281	33282	—	—						
C-1410	10714	30183	31712	—	—	—	8946		8944	27271	8945
C-1412	8943	—	—	27936	33283						

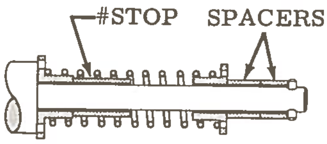
C-1430, C-1432, C-1450, C-1452



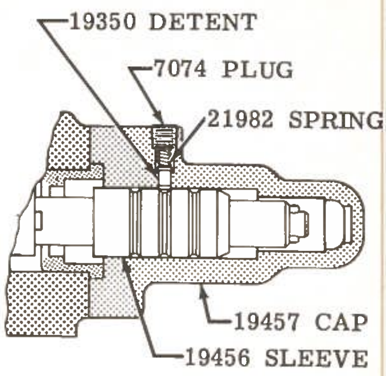
SUFFIX "F" MODELS



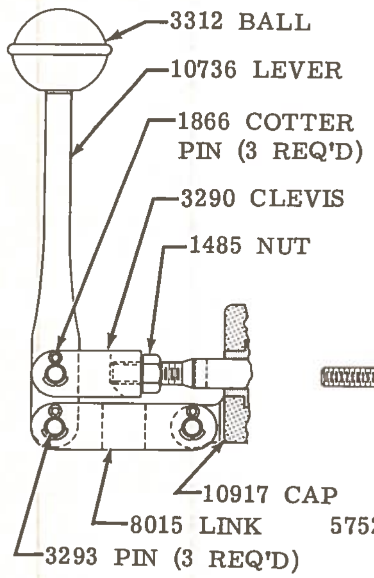
SUFFIX "A" MODELS



SUFFIX "B" MODELS

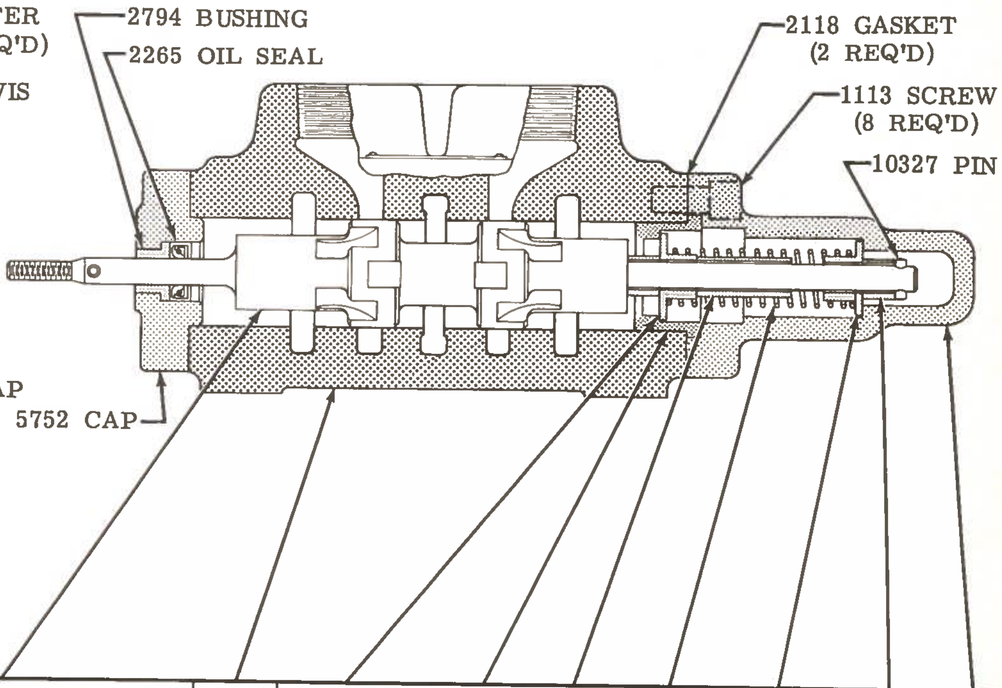


SUFFIX "NS" MODELS



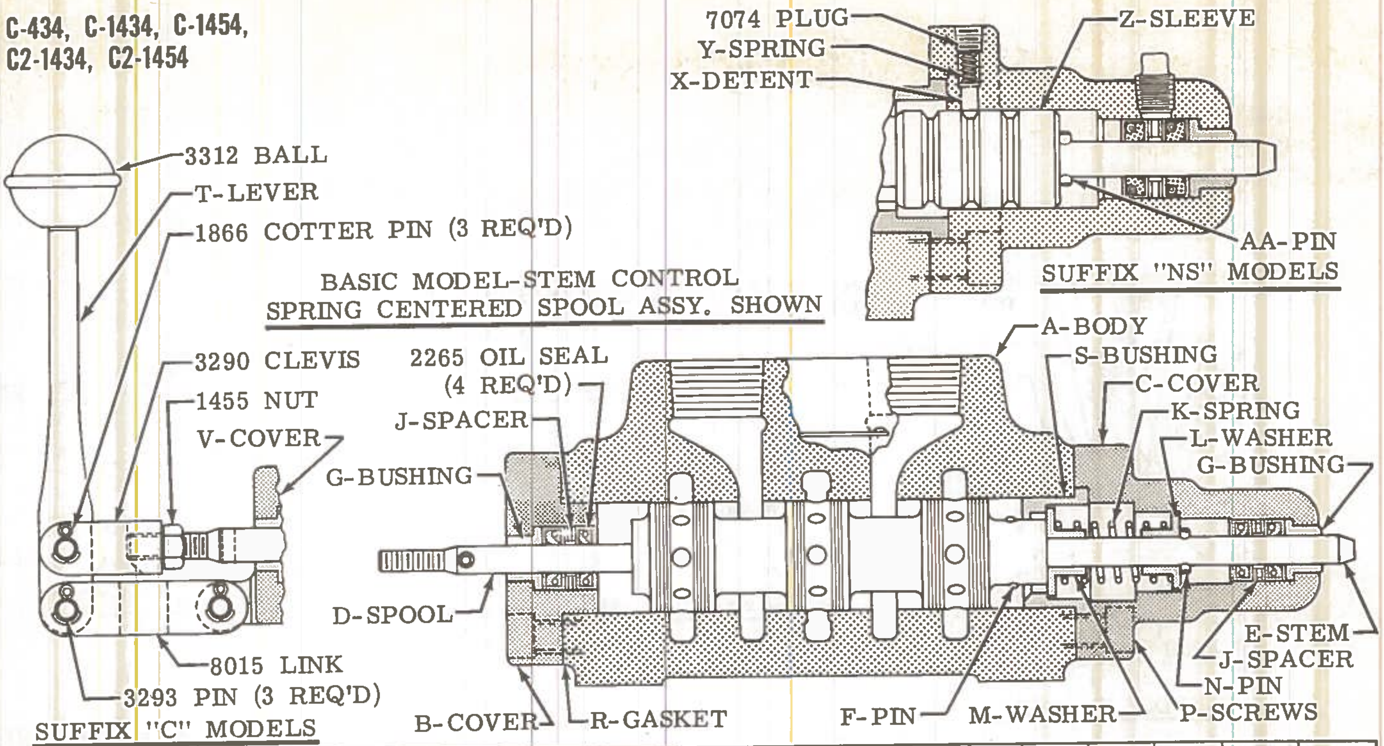
SUFFIX "C" MODELS

BASIC MODEL-STEM CONTROL
SPRING CENTERED SPOOL ASSY. SHOWN



MODEL	VALVE SPOOL					BODY	NOT USED ON "NS" MODELS						
	BASIC	S1	S2	S3	S4		COLLAR	BUSHING	#STOP	SPRING	COLLAR	SPACER	CAP
C-1430	76638	76640	76641	—	—	5701	5708	5709	38798 SEE NOTE ↓	2980	5707	5749 (2) REQ'D	5751
C-1432	76639	—	—	76642	76643								
C-1450	76638	76640	76641	—	—	17232							
C-1452	76639	—	—	76642	76643								

NOTE: STOP 38798 REPLACED BY 35510 ON SUFFIX "F" MODELS



PART LETTER AND NAME		SUFFIX LETTER	NO. REQ.	C-434	C-1434	C-1454	C2-1434	C2-1454
A	BODY	ALL	1	5646	5701	17232	5701	17232
B	COVER	EXCEPT -C	1	3346	5702	5702	—	—
C	COVER	EXCEPT -NS	1	3345	5703	5703	—	—
		-NS	1	5841	20666	20666	31477	31477
D	SPOOL	EXCEPT -NS	1	3350	5705	5705	—	—
		-NS	1	19436	5705	5705	5705	5705
E	STEM	EXCEPT -NS	1	—	5706	5706	—	—
		-NS	1	—	20664	20664	5706	5706
F	PIN	ALL	1	—	12273	12273	12273	12273
G	BUSHING	ALL	2	3355	2794	2794	2794	2794
J	SPACER	ALL	2	3356	5465	5465	5465	5465
K	SPRING	EXCEPT -NS	1	2949	2953	2953	—	—
L	WASHER	EXCEPT -NS	1	3354	5707	5707	—	—

PART LETTER AND NAME		SUFFEX LETTER	NO. REQ.	C-434	C-1434	C-1454	C2-1434	C2-1454
M	WASHER	EXCEPT -NS	1	3353	5708	5708	—	—
N	PIN	EXCEPT -NS	1	10187	10327	10327	—	—
P	SCREWS	ALL	8	1071	1113	1113	1113	1113
R	GASKET	ALL	2	40191	2118	2118	2118	2118
S	BUSHING	ALL	1	—	5709	5709	5709	5709
T	LEVER	-C	1	7156	10736	10736	10736	10736
V	COVER	-C	1	7157	15163	15163	15163	15163
X	DETENT	-NS	1	1937-X	19350	19350	19350	19350
Y	SPRING	-NS	1	2954	19467	19467	19467	19467
Z	SLEEVE	-NS	1	—	20665	20665	31476	31476
AA	PIN	-NS	1	—	10327	10327	10327	10327

MODEL CODE BREAKDOWN

C(2)-(1)4* *-(*)-(*)-(S*)

CONTROL VALVE

DESIGN

2-SECOND DESIGN
OMITTED-BASIC DESIGN

PORT SIZES

47-3/8" NPT
43-3/4" NPT
141-1 " NPT
143-1 1/4" NPT
145-1 1/2" NPT

BASIC SPOOL

0-OPEN CENTER
2-CLOSED CENTER
4-TANDEM CENTER
6-CLOSED CENTER
8-OPEN CENTER

CONTROL

C-LEVER
F-TREADLE
OMITTED-STEM

POSITIONING

A-SPRING OFFSET TO EXTENDED POSITION
B-SPRING OFFSET TO RETRACTED POSITION
NS-NO SPRING, THREE POSITION DETENT
OMITTED-SPRING CENTERED

SPECIAL FEATURES

OMITTED-STANDARD
S* - SPECIAL

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

Service Parts Information

NO-SPRING DETENTED AIR OPERATED DIRECTIONAL VALVES

DG18S2-012N-52
DG18S4-01*(*)N-52

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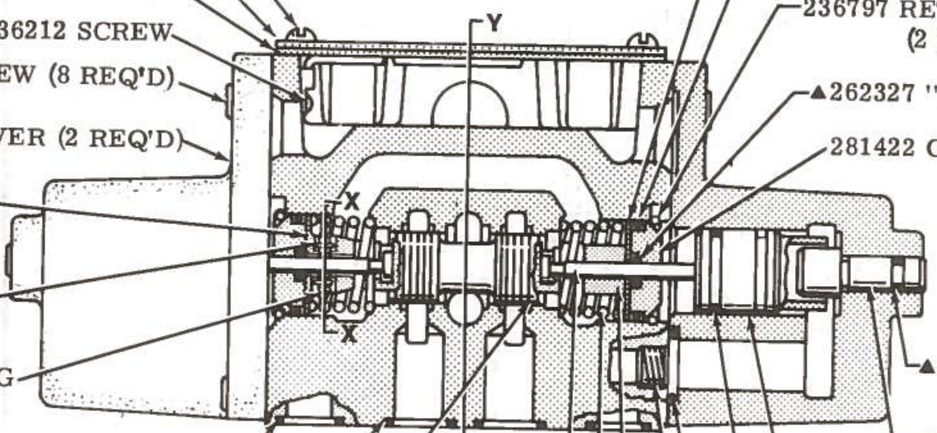

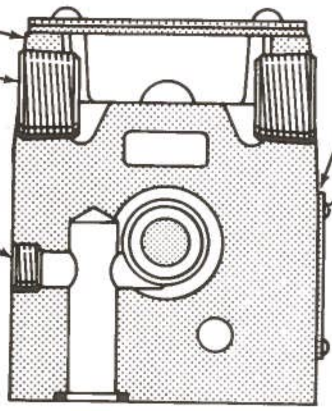

SECTION Y-Y

SECTION X-X

MODEL	SPOOL	DIAGRAM PLATE
DG18S2-012N-52	289186	578457
DG18S4-010N-52	213230	578458
DG18S4-012N-52	213231	
DG18S4-016N-52	213232	
DG18S4-017N-52	236624	
DG18S4-0129N-52	*213231	578459
DG18S4-0133N-52	236615	578458

*TYPE 29 SPOOL IS FOR USE AS PILOT FOR NO SPRING DETENTED TWO STAGE VALVE ONLY.

▲INCLUDED IN 919681 SEAL KIT

●INCLUDED IN 942132 DETENT KIT

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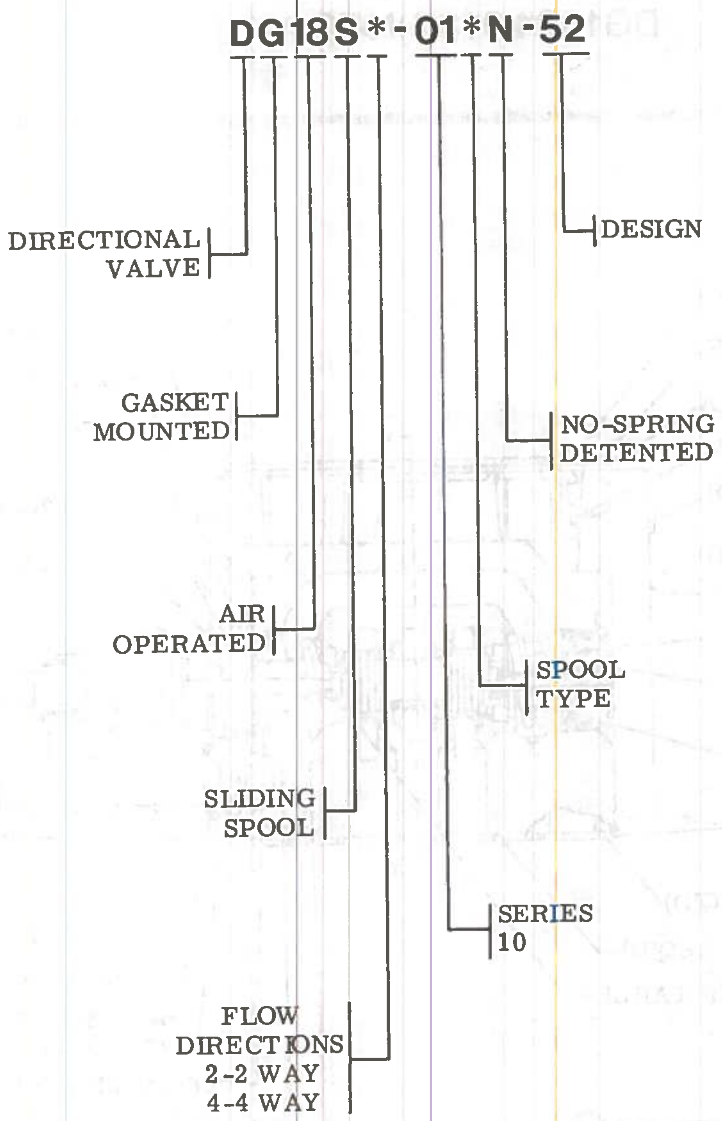
MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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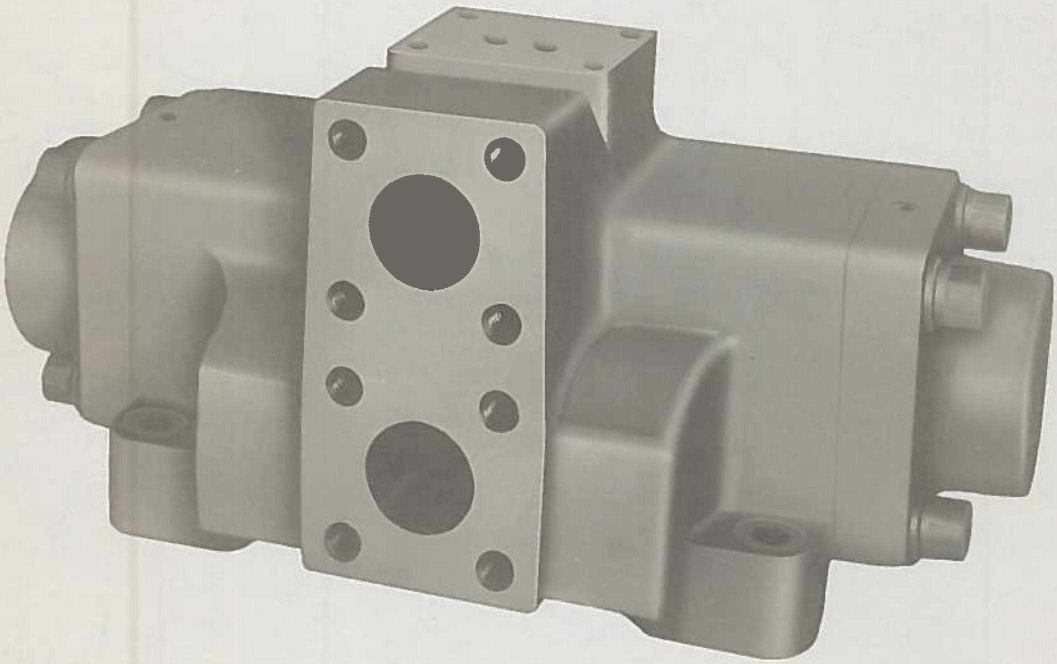
Service Parts Information

Spring Offset Pilot Operated Directional Control Valve

DF3S4-16*A-*-53



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I-3555-S

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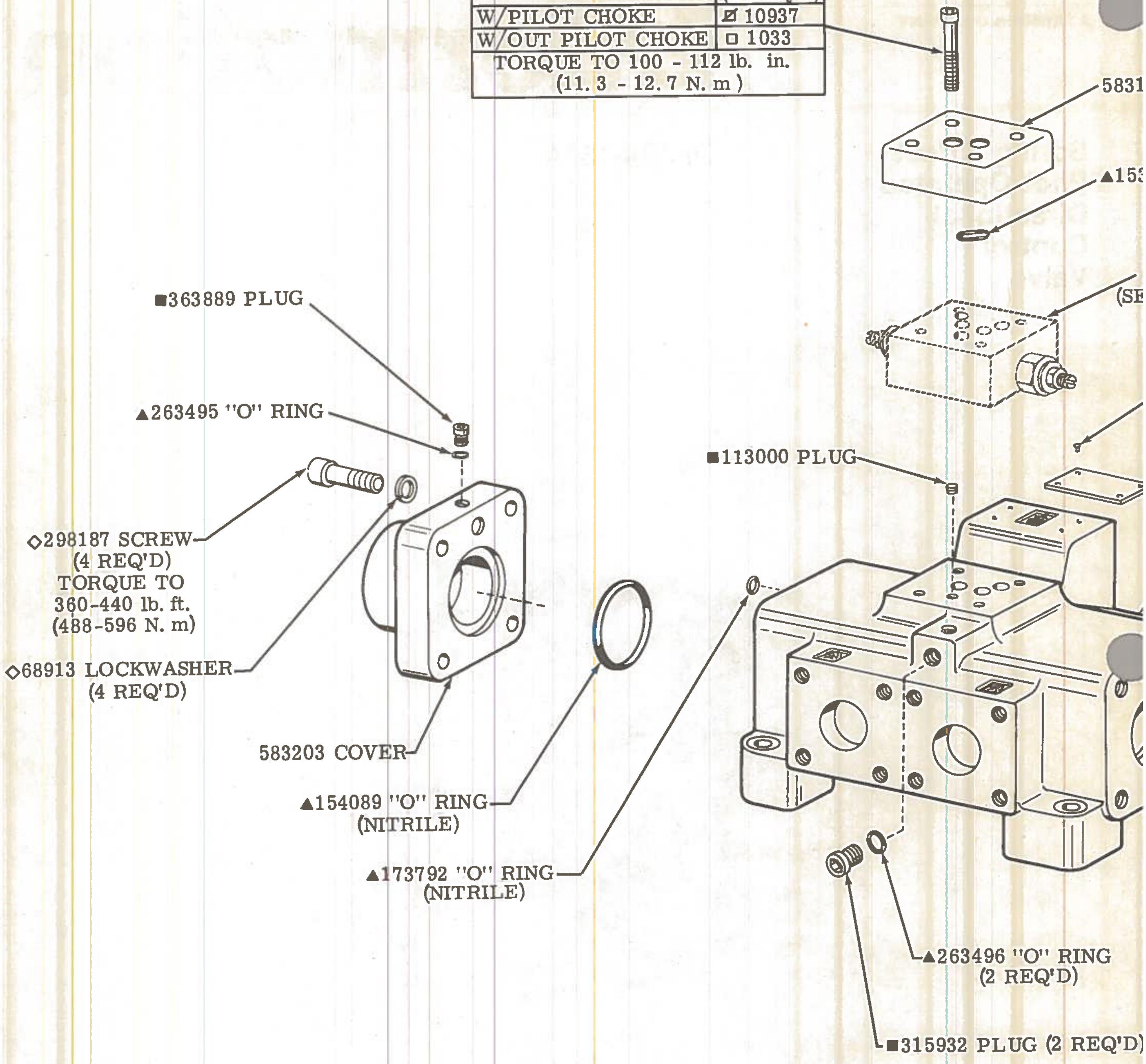
MODEL	BOLT (4 REQ'D)
W/PILOT CHOKE	⊠ 10937
W/OUT PILOT CHOKE	□ 1033
TORQUE TO 100 - 112 lb. in. (11. 3 - 12. 7 N. m)	



△▲INCLUDED IN STD. SEAL KIT 919406
F3 EQUIVALENT SEAL KIT 919410
◇INCLUDED IN FASTENER KIT 941309
□INCLUDED IN BOLT KIT 255651
⊠INCLUDED IN BOLT KIT 255637
■PLUG TORQUES (SEE TABLE)

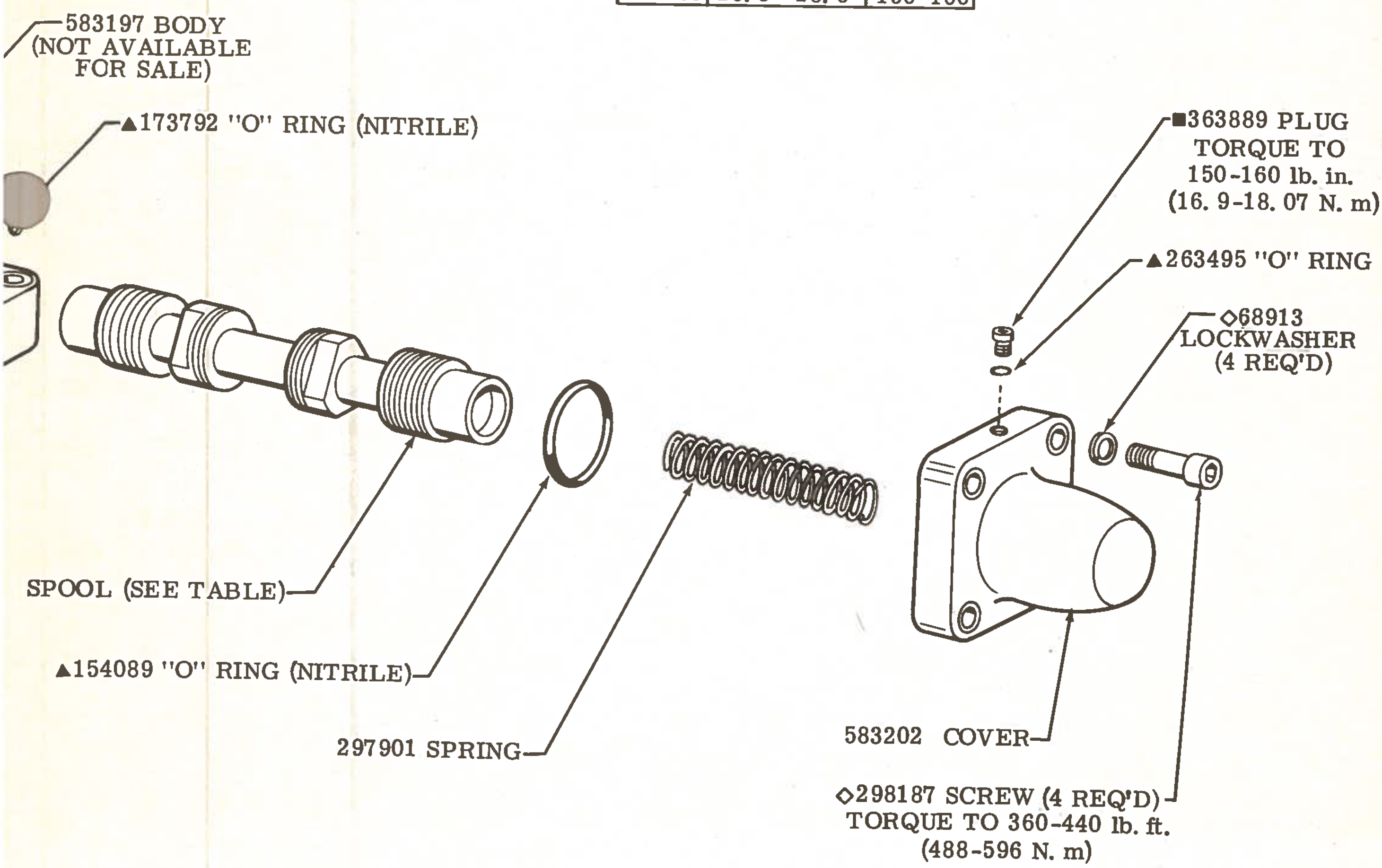
NOTE
SAE STRAIGHT THREAD PLUGS USED ON EXTERIOR OF VALVE

SEE PARTS DRAWING I-3962-S FOR CONNECTION FLANGES

NOTE
RIGHT HAND ASSEMBLY SHOWN. FOR LEFT HAND ASSEMBLY, END COVERS & SPRING ARE REVERSED & I.D. PLATE IS CHANGED TO L.H. (EXAMPLE: DF3S4-160A-53-LH)

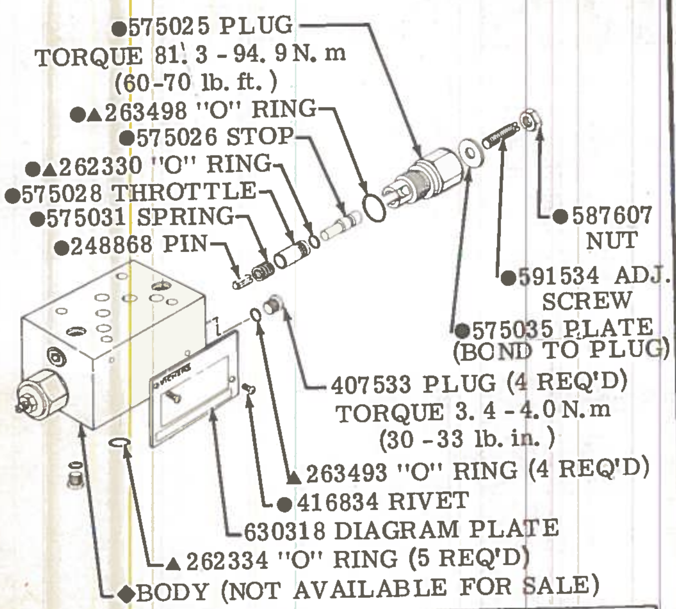
MODEL	SPOOL	IDENT. PLATE	
		R. H.	L. H.
DF3S4-160A-*-53	273677	400960	434311
DF3S4-162A-*-53	273676		
DF3S4-166A-*-53	275804		
DF3S4-169A-*-53	275806		
DF3S4-1633A-*-53	317777		

■PLUG TORQUES(OILED)		
PLUG	N. m.	lb. in.
7075	20.0 -23.0	180-205
113000	5.0 - 5.9	45-52
315932	22.5 -27.0	200-240
363889	16.9 -18.0	150-160



NOTE
PART NUMBERS INCLUDED IN KITS WILL NOT BE SOLD SEPARATELY.

MODELS WITH PILOT CHOKE

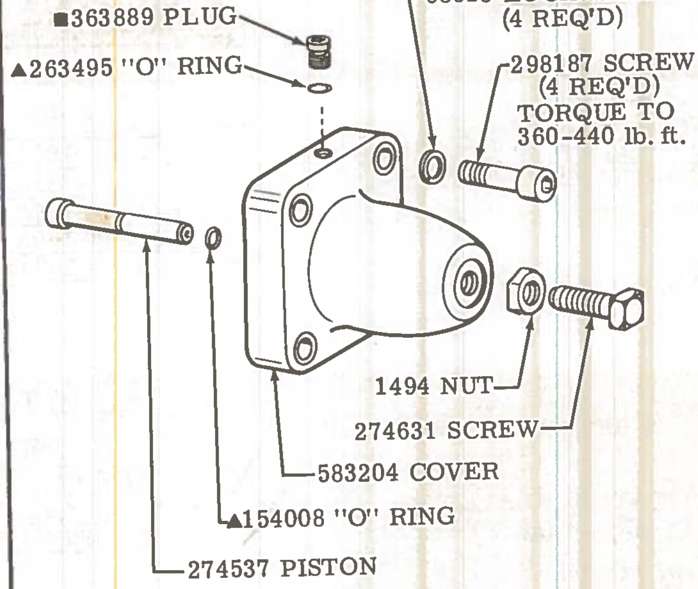


◆ORDER COMPLETE CHOKE (DGMFN-5-Y-AW-BW-20) IF BODY IS REQUIRED.

●QTY. 2 REQ'D

▲INCLUDED IN 920246 SEAL KIT

STROKE ADJUSTMENT PARTS



MODEL CODE BREAKDOWN

(F3) DF3S4-16*A-*-53-(LH)

- (F3) — MULTI-FLUID CAPABILITY VITON SEALS
- D — DIRECTIONAL CONTROL VALVES
- F — FLANGE CONNECTION
- 3 — PILOT OPERATED
- S — SLIDING SPOOL
- 4 — FLOW DIRECTION: 4 - 4 WAY
- 16 — VALVE SIZE: 160 SERIES (2.00 INCH)
- * — SPOOL TYPE
- A — SPRING OFFSET
- * — SPOOL CONTROL MODIFICATION
  - 2 - PILOT CHOKE ADJUSTMENT
  - 7 - STROKE ADJUST. CYLINDER "A" END ONLY (RH MODEL)
  - 8 - STROKE ADJUST. CYLINDER "B" END ONLY (LH MODEL)
- 53 — DESIGN
- (LH) — OFFSET TO "B"; OMIT FOR STD. OFFSET TO "A" MODELS.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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Service Parts Information

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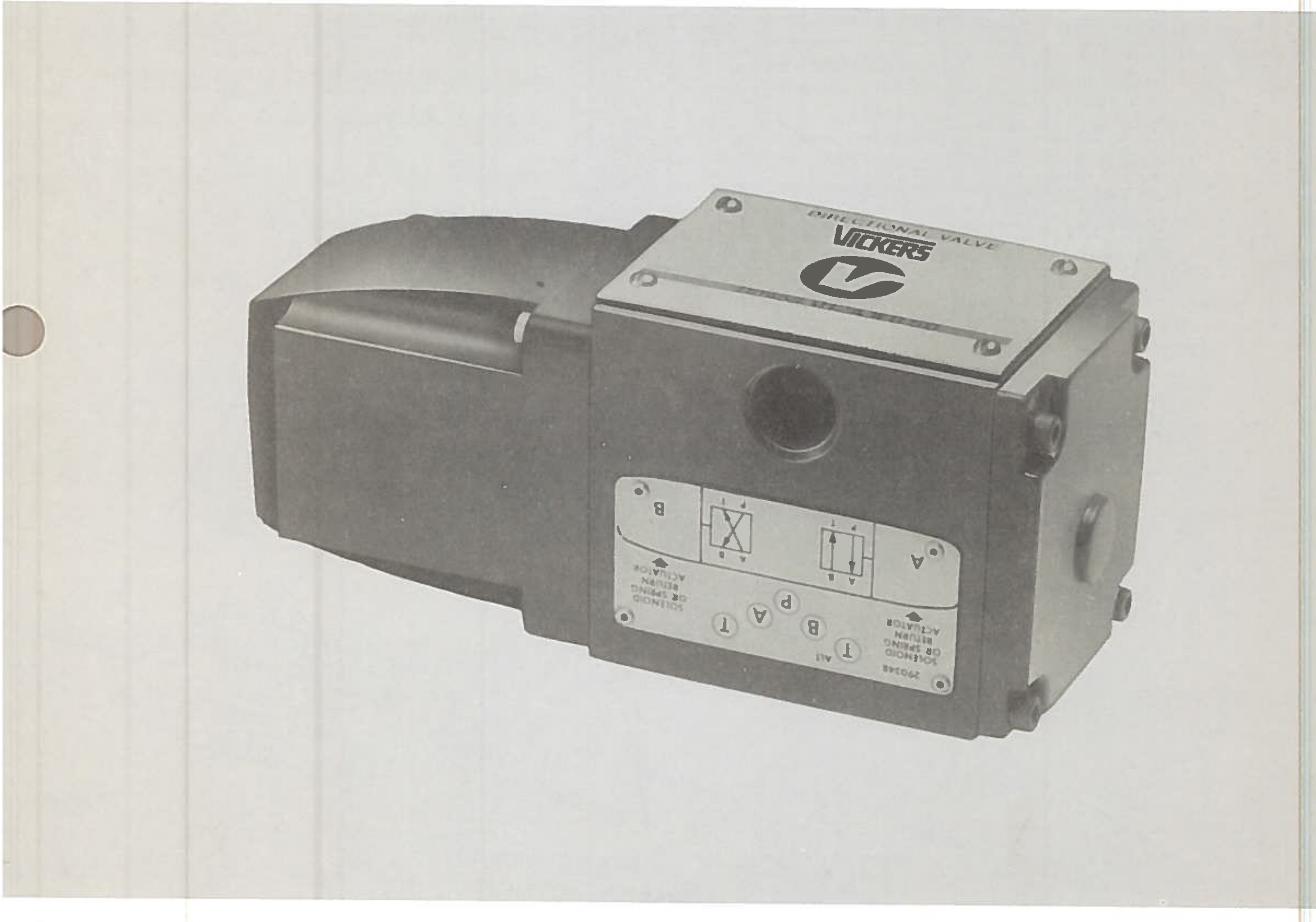
Wet Armature Solenoid Operated Directional Valve

DG4S*-01*A-W(3)-*-50



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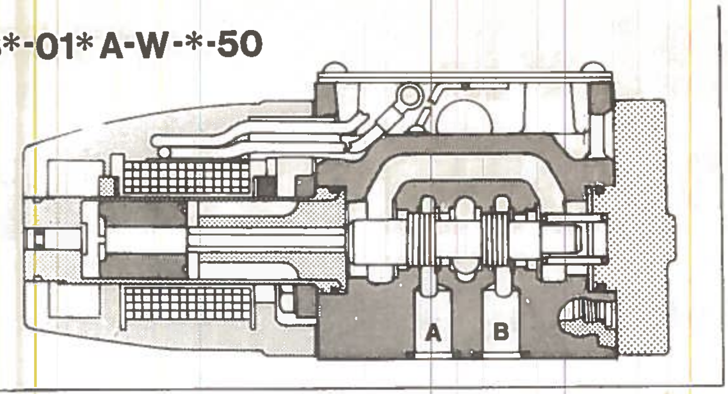
DG4S*-01* A-W-*-50



NOTE
RIGHT HAND ASSEMBLY SHOWN. FOR LEFT I
ASSEMBLY ALL PARTS, EXCEPT BODY, ARE
VERSED. EXAMPLE OF LEFT HAND MOD
DG4S*-012A-W-*-50-LH.

MODEL	SPOOL	DIAGRAM PLATE	SPOOL KIT
DG4S2-012A-W-*-50	573396	290347	940701
DG4S2-012A-W-*-50LH		577488	941010
DG4S4-010A-W-*-50	572287	290348	940703
DG4S4-010A-W-*-50LH		577490	941011
DG4S4-012A-W-*-50	463426	290348	940704
DG4S4-012A-W-*-50LH		577490	941012
DG4S4-016A-W-*-50	572288	290348	940705
DG4S4-016A-W-*-50LH		577490	941013

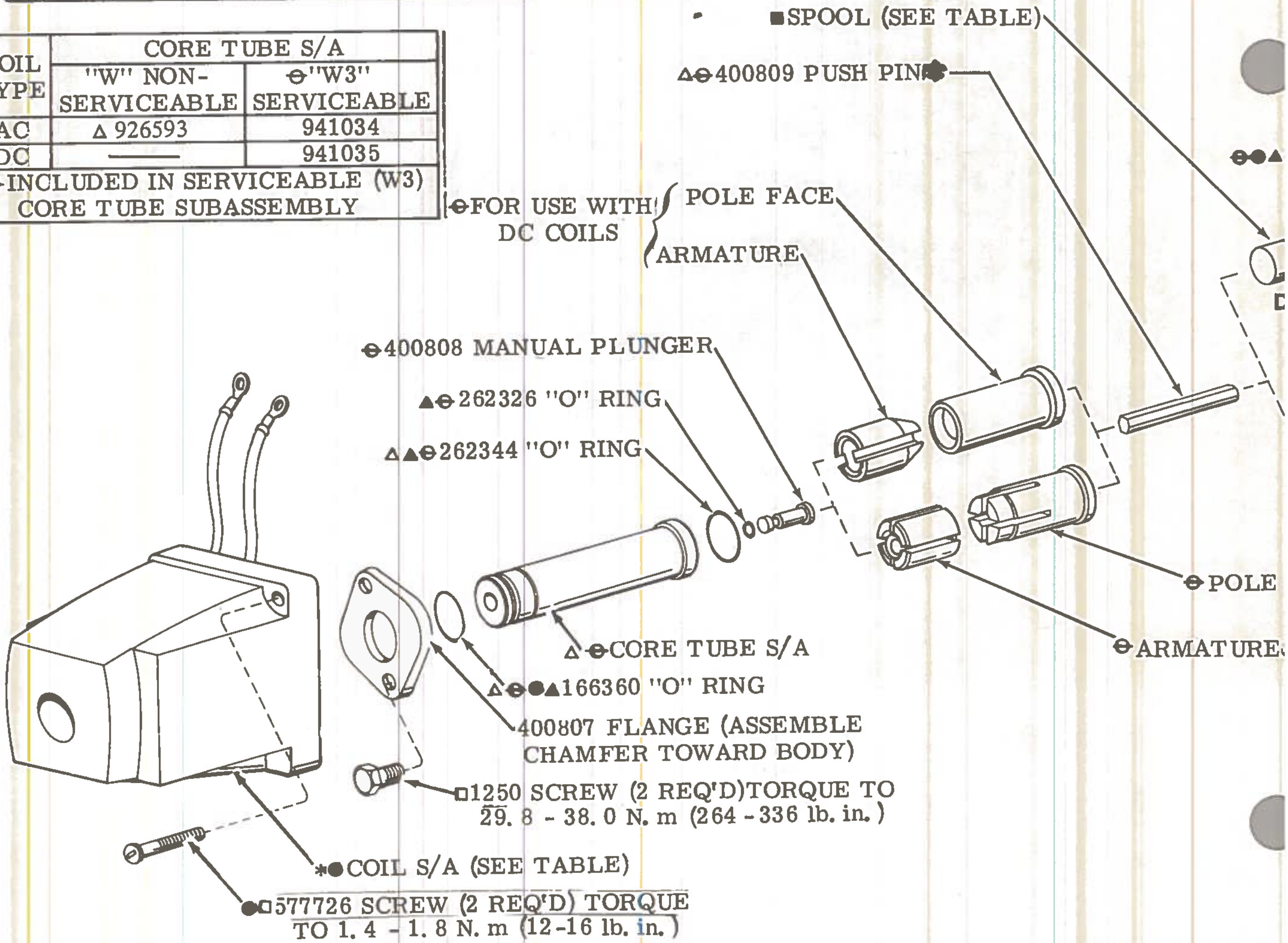
SPOOL KIT INCLUDES SPOOL, DIAGRAM PLATE, SEAL KIT, AND PARTS PREFIXED WITH A CLOSED SQUARE SYMBOL (■).

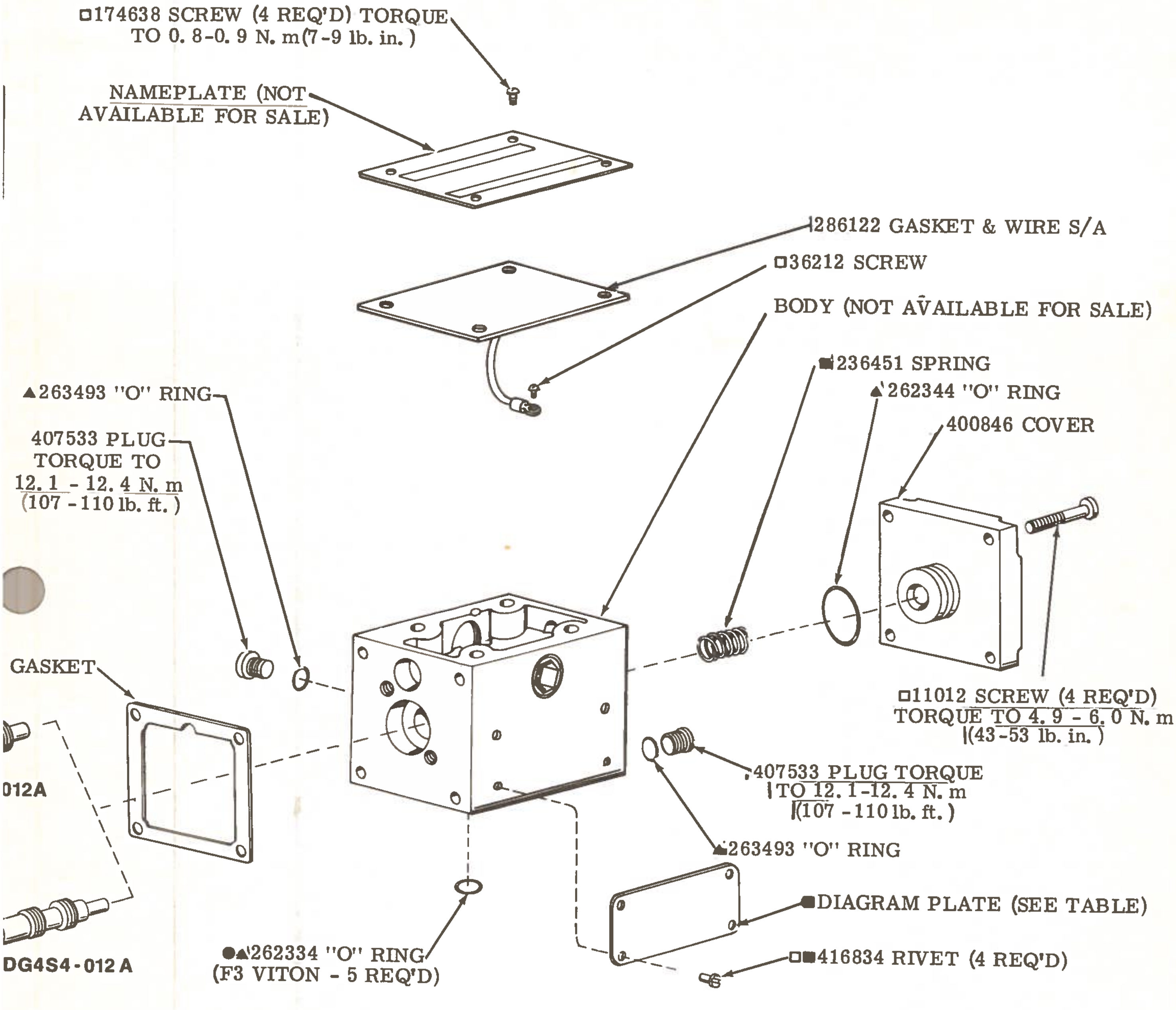
NOTE
PART NUMBERS PREFIXED WITH A SYMBOL ARE AVAILABLE ONLY AS SERVICE KITS.

⚜SUFFIX SYMBOL PERTAINS ONLY TO VICKERS MATERIAL CONTROL

COIL TYPE	CORE TUBE S/A "W" NON-SERVICEABLE	CORE TUBE S/A ⊖"W3" SERVICEABLE
AC	△ 926593	941034
DC	———	941035

⊖INCLUDED IN SERVICEABLE (W3) CORE TUBE SUBASSEMBLY





R USE WITH
AC COILS

□INCLUDED IN FASTENER KIT 942465

▲INCLUDED IN F3 SEAL KIT 920109

● INCLUDED IN COIL KIT					
● COIL S/A	COIL KIT	AC VOLT/Hz	DC VOLT	COIL CODE	DIN COIL
400823	942466	110/50, 115/60, 120/60		B	463328
400824	942467	220/50, 230/60		D	463329
400825	942468	440/50, 460/60		M	463330
400826	942469		12	G	463331
400827	942470		24	H	463332
435755	941017	127/50		EG	
582214	941109		250	X	617244
730273	926461		48	J	
		100/50, 100/60		T	977929
		380/50, 380/60		DZ	617370

*CAUTION
CORRECT ARMATURE AND POLE FACE MUST BE USED FOR AC AND DC OPERATION.

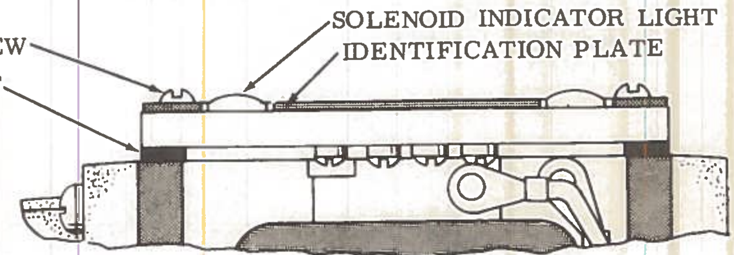
MODEL CODE BREAKDOWN

(F3)-DG4S-01*A-W3-*-50-(LH)**

- (F3) — MULTI-FLUID CAPABILITY (VITON SEALS)
- D — DIRECTIONAL VALVE
- G — MANIFOLD OR SUBPLATE MOUNTING
- 4 — SOLENOID OPERATED
- S — SLIDING SPOOL
- * — FLOW DIRECTION
  - 2 - WAY
  - 4 - WAY
- * — SOLENOID INDICATOR LIGHTS
  - L - LIGHT
  - (OMITTED - NONE)
- 01 — SERIES
- * — SPOOL TYPE
- A — A - OFFSET
- W3 — WET ARMATURE TYPE
  - W - NON-SERVICEABLE CORE TUBE S/A
  - W3 - SERVICEABLE CORE TUBE S/A
- * — COIL IDENTIFICATION LETTER
- 50 — DESIGN
- (LH) — LEFT HAND ASSEMBLY

WARNING: USE THIS DRAWING FOR PARTS INFORMATION ONLY.

FOR MODELS WITH SOLENOID INDICATOR LIGHTS



SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617

NOTE
REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURE.

To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

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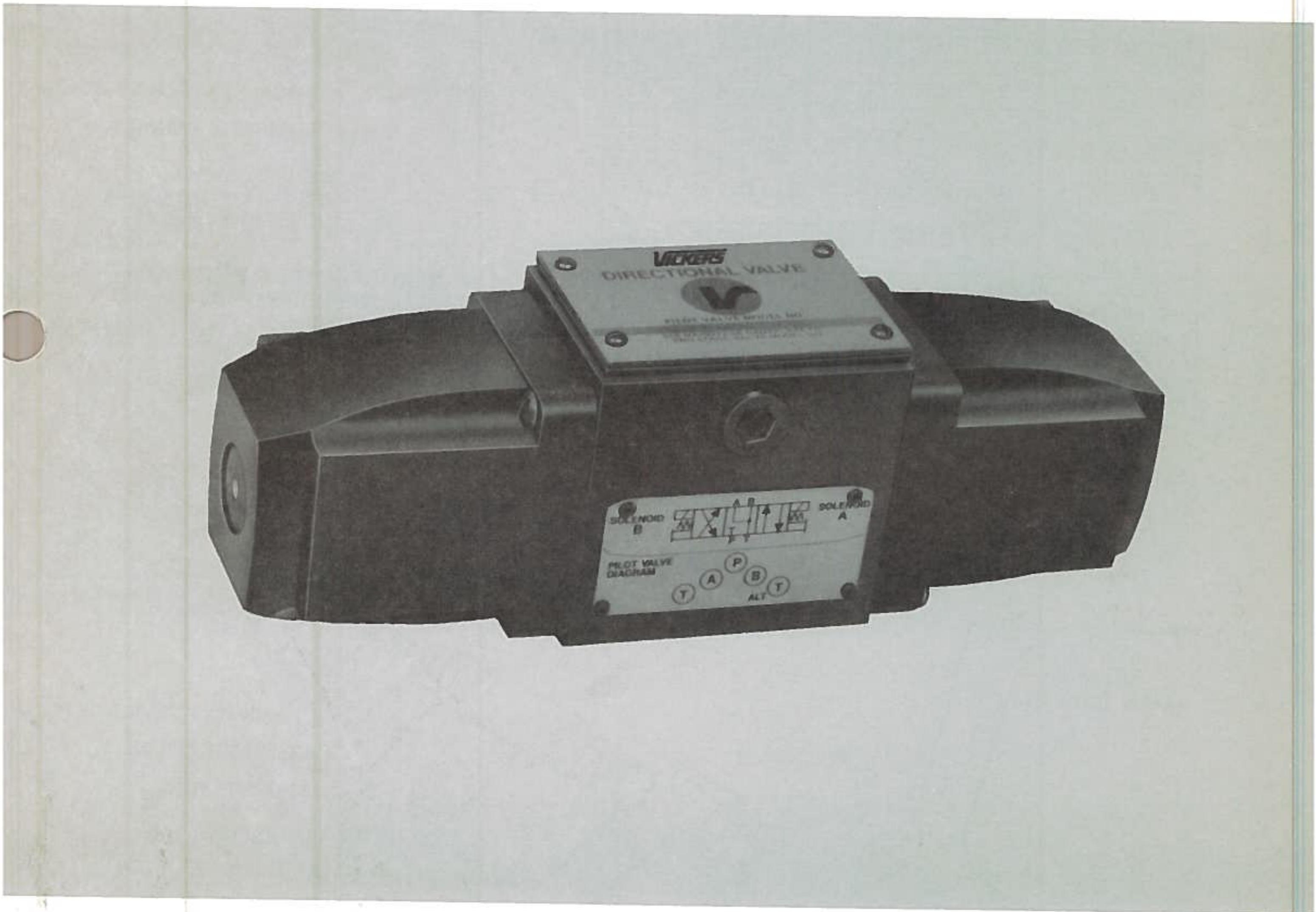
Service Parts Information

Wet Armature Solenoid Operated Directional Valves

F6-DG4S4-01*(*)C-W3-*-50



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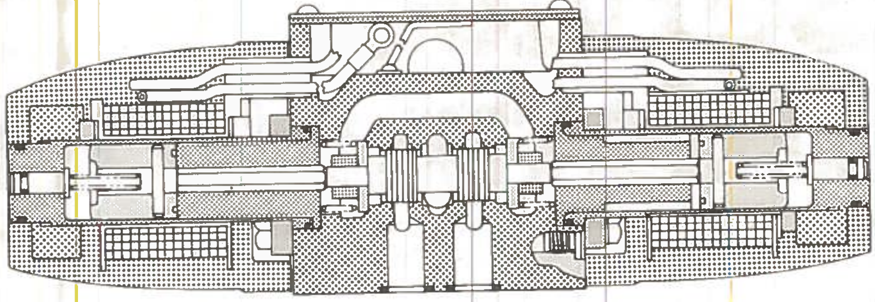
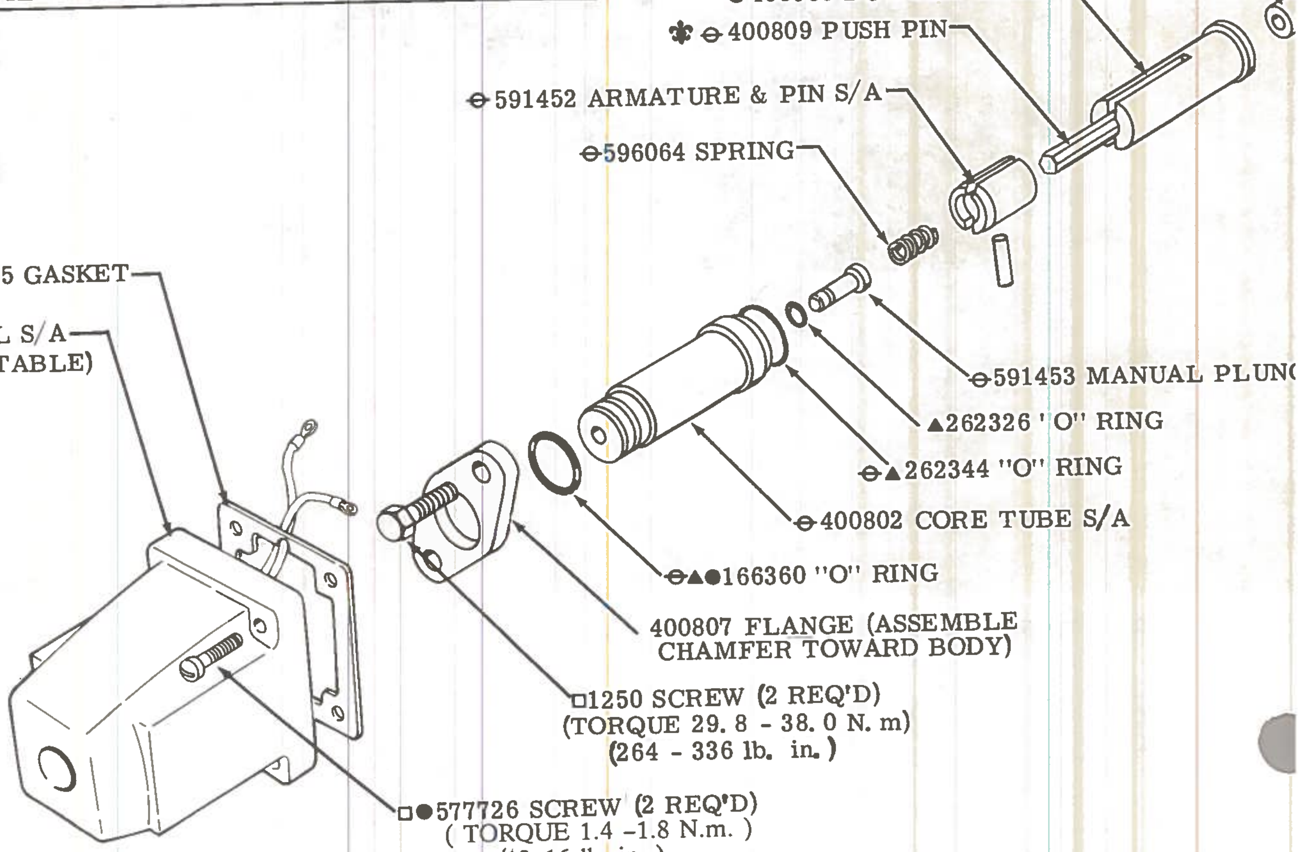
I-3642-S

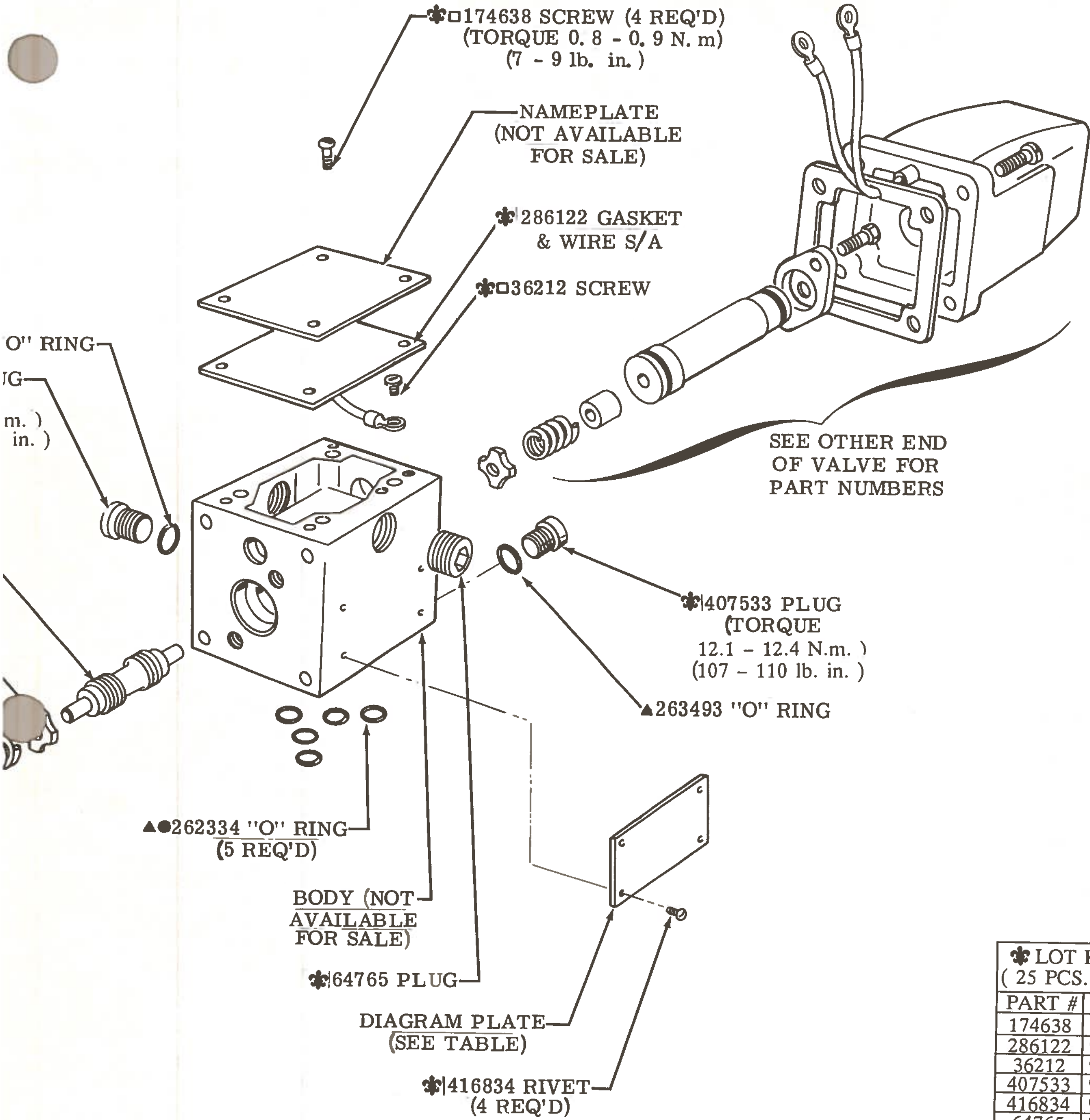


NOTE
PART NUMBERS PREFIXED WITH A SYMBOL ARE AVAILABLE ONLY AS SERVICE KITS.

*ASSEMBLE WASHER WITH SHARP BREAK EDGE TOWARD OUTSIDE OF VALVE.

MODEL	SPOOL	DIAGRAM PLATE	SPOOL KIT
F6-DG4S4-010C-W3-*-50	463385	290341	940711
F6-DG4S4-011C-W3-*-50	463386	290342	940712
F6-DG4S4-012C-W3-*-50	463387	290343	940713
F6-DG4S4-013C-W3-*-50	463388	290344	940714
F6-DG4S4-016C-W3-*-50	463389	290345	940715
F6-DG4S4-0168C-W3-*-50		577480	*941014
F6-DG4S4-017C-W3-*-50	463390	290346	940716
F6-DG4S4-0178C-W3-*-50		577482	*941015
F6-DG4S4-018C-W3-*-50	463391	290340	940717
F6-DG4S4-0133C-W3-*-50	463392	577484	940718
ASSEMBLE TYPE 1 SPOOL WITH RELIEVED LAND TOWARD "A" PORT.			
ASSEMBLE TYPE 3 SPOOL WITH NARROW LAND TOWARD "A" PORT.			
SPOOL KIT INCLUDES SPOOL, DIAGRAM PLATE, SEAL KIT AND PARTS PREFIXED WITH A CLOSED SQUARE SYMBOL (■).			
* ORDER THIS SPOOL KIT WHEN VALVE IS USED AS THE PILOT STAGE ON DG5S4-**4/8C/D MODELS.			





⚜ LOT KITS (25 PCS. ONLY)	
PART #	KIT #
174638	944054
286122	944043
36212	944053
407533	944040
416834	944027
64765	944042
400809	926310

▲INCLUDED IN F3 SEAL KIT 920109

□INCLUDED IN FASTENER KIT 942465

●INCLUDED IN COIL KIT			
●COIL S/A	COIL KIT	AC VOLT/Hz	COIL CODE
400823	942466	110/50, 115/60, 120/60	B
400824	942467	220/50, 230/60	D
400825	942468	440/50, 460/60	M
435755	941017	127/50	EG

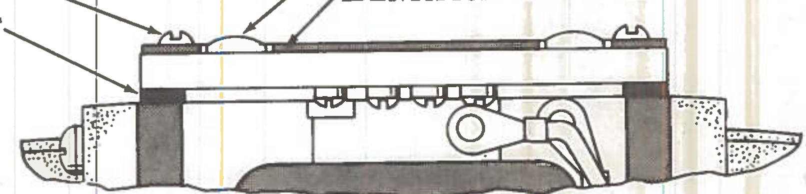
⊖INCLUDED IN 941493 AC CORE TUBE KIT
⊖INCLUDED IN 941416 DC CORE TUBE KIT

MODEL CODE BREAKDOWN

F6-DG4S4 * -01 * C-W3- * -50

- HIGH WATER BASE FLUIDS (F6)
- DIRECTIONAL VALVE (D)
- MANIFOLD OR SUBPLATE MOUNTED (G)
- SOLENOID OPERATED (4)
- SLIDING SPOOL (S)
- FLOW DIRECTION 4 - 4 WAY (4)
- SOLENOID INDICATOR LIGHTS: L - LIGHT, OMITTED - NONE (*)
- SERIES (01)
- SPOOL TYPE (*)
- C - SPRING CENTERED (C)
- WET ARMATURE W3 - SERVICEABLE CORE TUBE S/A (W3)
- COIL IDENTIFICATION LETTER (*)
- DESIGN (50)

FOR MODELS WITH
SOLENOID INDICATOR LIGHTS



SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617

NOTE
REFER TO PARTS DRAWING I-3487-S
FOR MODELS WITH PLUG-IN FEATURE.

To insure sustained efficiency and maximum trouble-free life of this precision equipment, initial and continuous filtration of the fluid medium to 25 microns absolute or less is essential. (For information pertaining to Vickers economical filters, see bulletin 81-216.)

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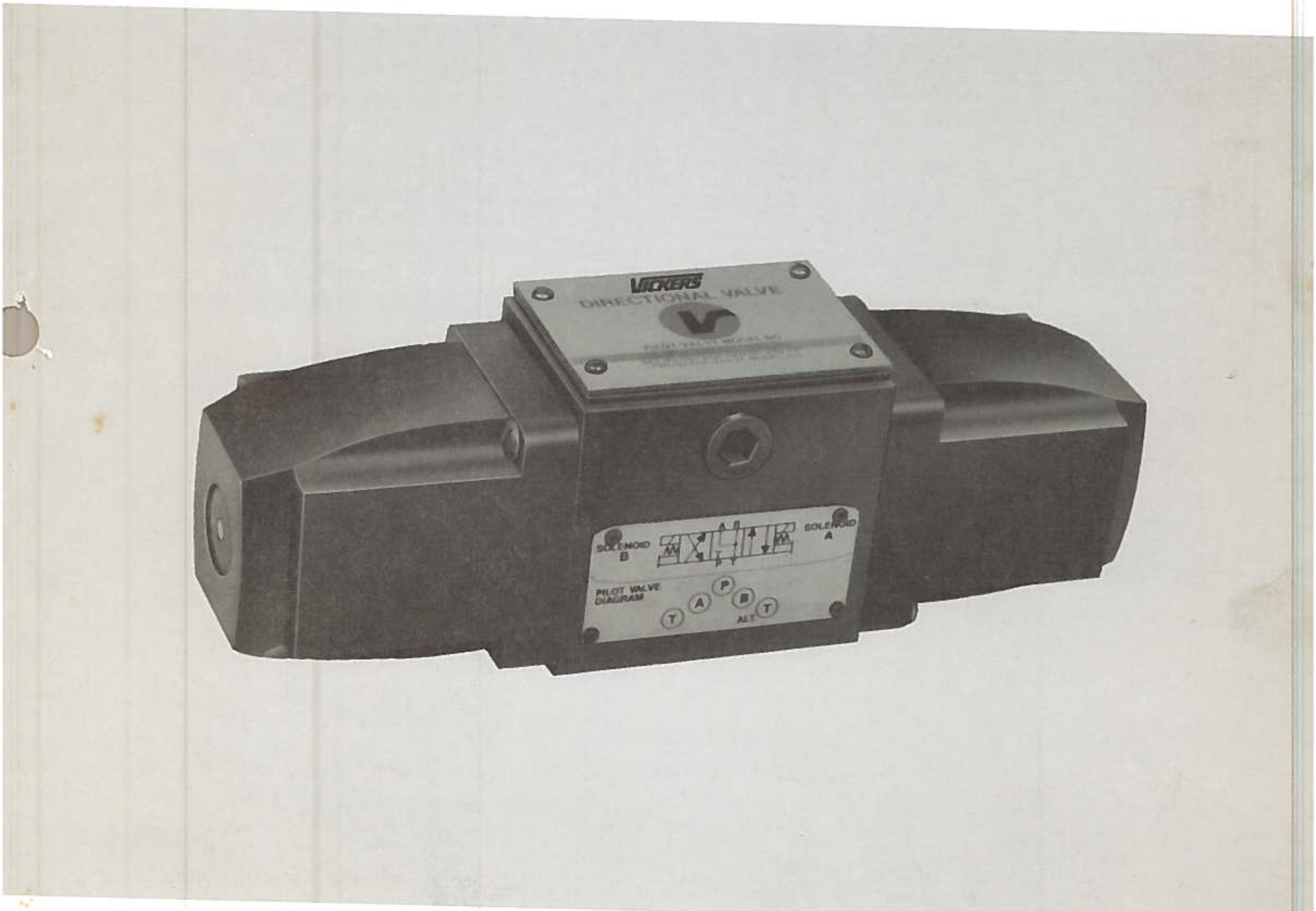
Service Parts Information

Wet Armature Solenoid Operated Directional Valve

DG4S4-01*(*)B/C-W3-*-50



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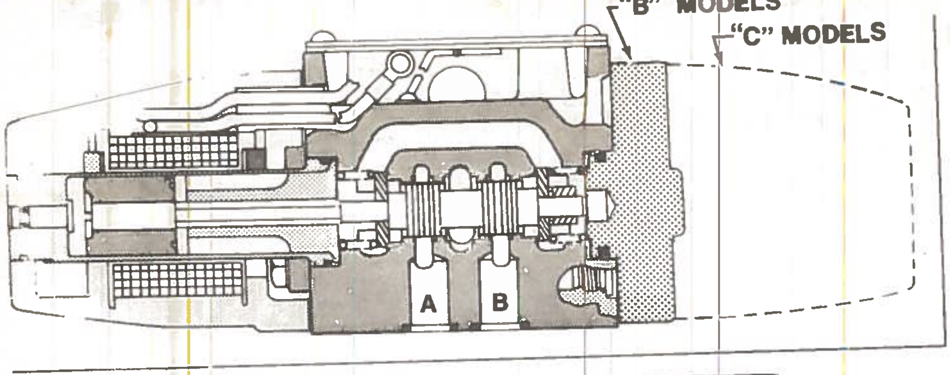
Revised 10-1-88

I-3558-S

100

WARNING: USE THIS DRAWING FOR PARTS INFORMATION ONLY.

DG4S4-01*B/C-W-*-50



◆A TYPE '68' SPOOL KIT IS THE SAME AS T '6' EXCEPT A DIFFERENT DIAGRAM PLAT AND THE 'B' MODEL SOLENOID IS ASSEM THE OPPOSITE END OF THE VALVE. A PILOT VALVE IS REQUIRED FOR A (C) SPR TERED TWO STAGE VALVE WITH '4' OR MAIN STAGE SPOOLS.

A TYPE '78' SPOOL KIT IS THE SAME AS ' '7' EXCEPT A DIFFERENT DIAGRAM PLAT A TYPE '78' PILOT VALVE IS REQUIRED PRESSURE CENTERED TWO STAGE VALV OR '8' TYPE MAIN STAGE SPOOLS.

MODEL	SPOOL	DIAGRAM PLATE	SPOOL KIT
DG4S4-010B/C-W-*-50	463385	290341	940711
DG4S4-011B/C-W-*-50	463386	290342	940712
DG4S4-012B/C-W-*-50	463387	290343	940713
DG4S4-013B/C-W-*-50	463388	290344	940714
DG4S4-016B/C-W-*-50	463389	290345	940715
DG4S4-0168B/C-W-*-50		577480	◆941014
DG4S4-017B/C-W-*-50	463390	290346	940716
DG4S4-0178B/C-W-*-50		577482	◆941015
DG4S4-018B/C-W-*-50	463391	290340	940717
DG4S4-0133B/C-W-*-50	463392	577484	940718

ASSEMBLE TYPE 1 SPOOL WITH RELIEVED LAND TOWARD "A" PORT.
ASSEMBLE TYPE 3 SPOOL WITH NARROW LAND TOWARD "A" PORT.

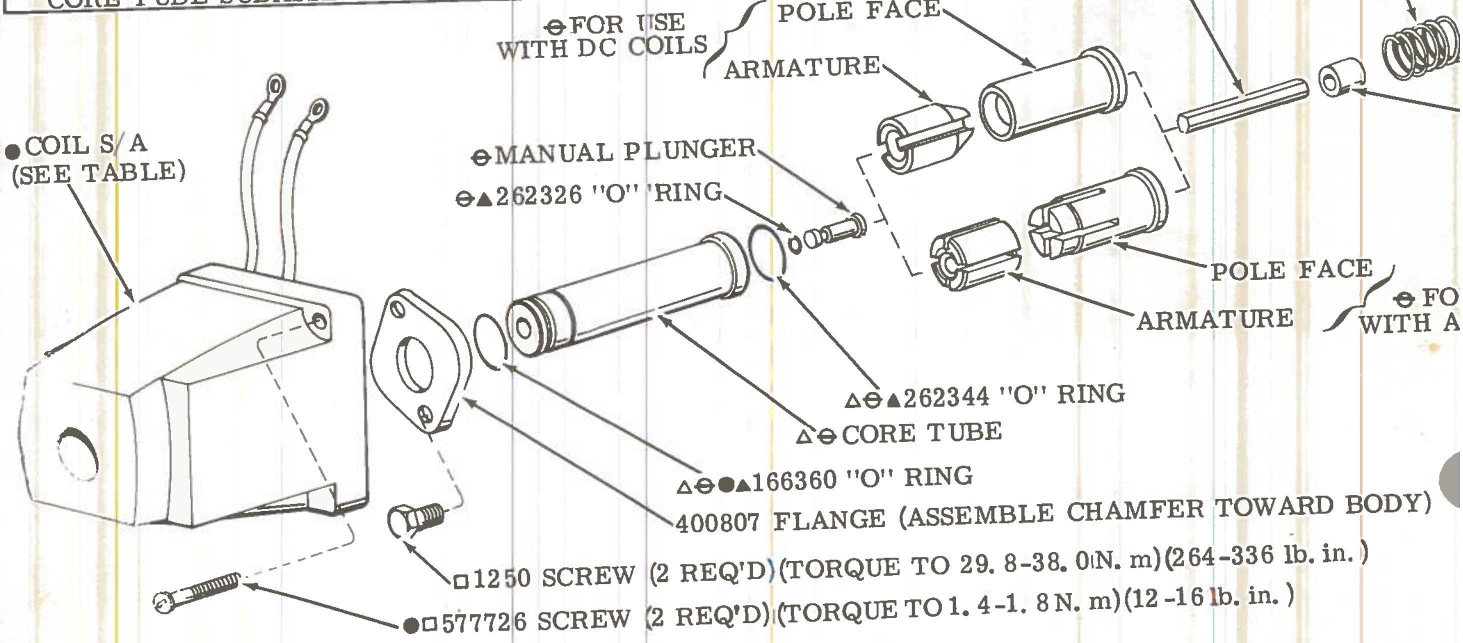
SPOOL KIT INCLUDES SPOOL, DIAGRAM PLATE, SEAL KIT AND PARTS PREFIXED WITH A CLOSED SQUARE SYMBOL (■).

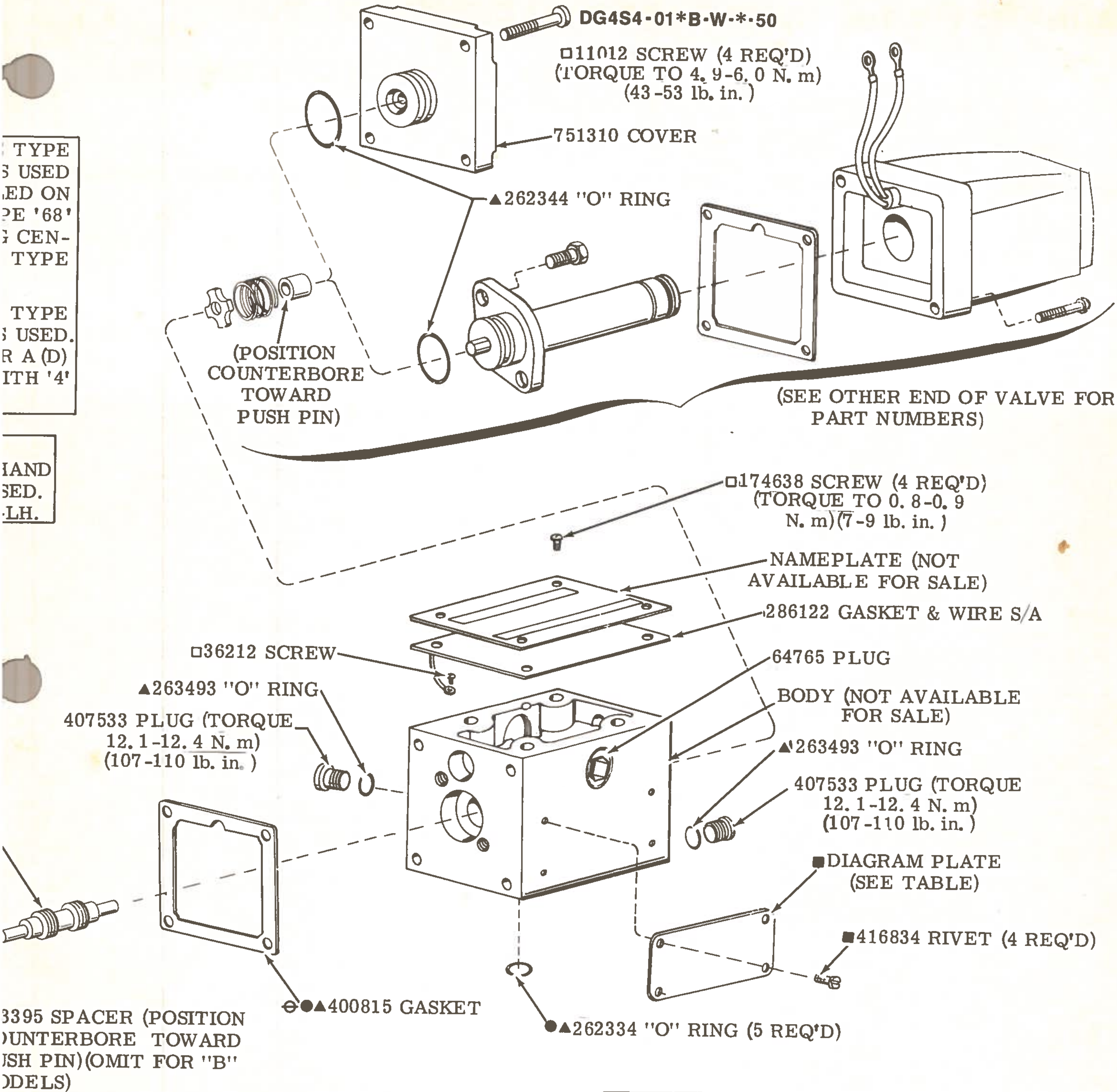
NOTE
RIGHT HAND ASSEMBLY SHOWN (B MODELS). FOR LE ASSEMBLY ALL PARTS, EXCEPT BODY, ARE RE EXAMPLE OF LEFT HAND MODEL: DG4S4-012B-W-

△ASSEMBLE WASHER WITH SHARP BREAK EDGE TOWARD OUTSIDE OF VALVE.

COIL TYPE	"W" NON-SERVICEABLE	"W3" SERVICEABLE
AC	△ 926593	941034
DC	———	941035

⊖INCLUDED IN SERVICEABLE (W3) CORE TUBE SUBASSEMBLY.





NOTE
PART NUMBERS PREFIXED WITH A SYMBOL ARE AVAILABLE ONLY AS SERVICE KITS.

✽SUFFIX SYMBOL PERTAINS ONLY TO VICKERS MATERIAL CONTROL

▲SERVICE ALL UNITS W/F3 SEAL KIT 920109

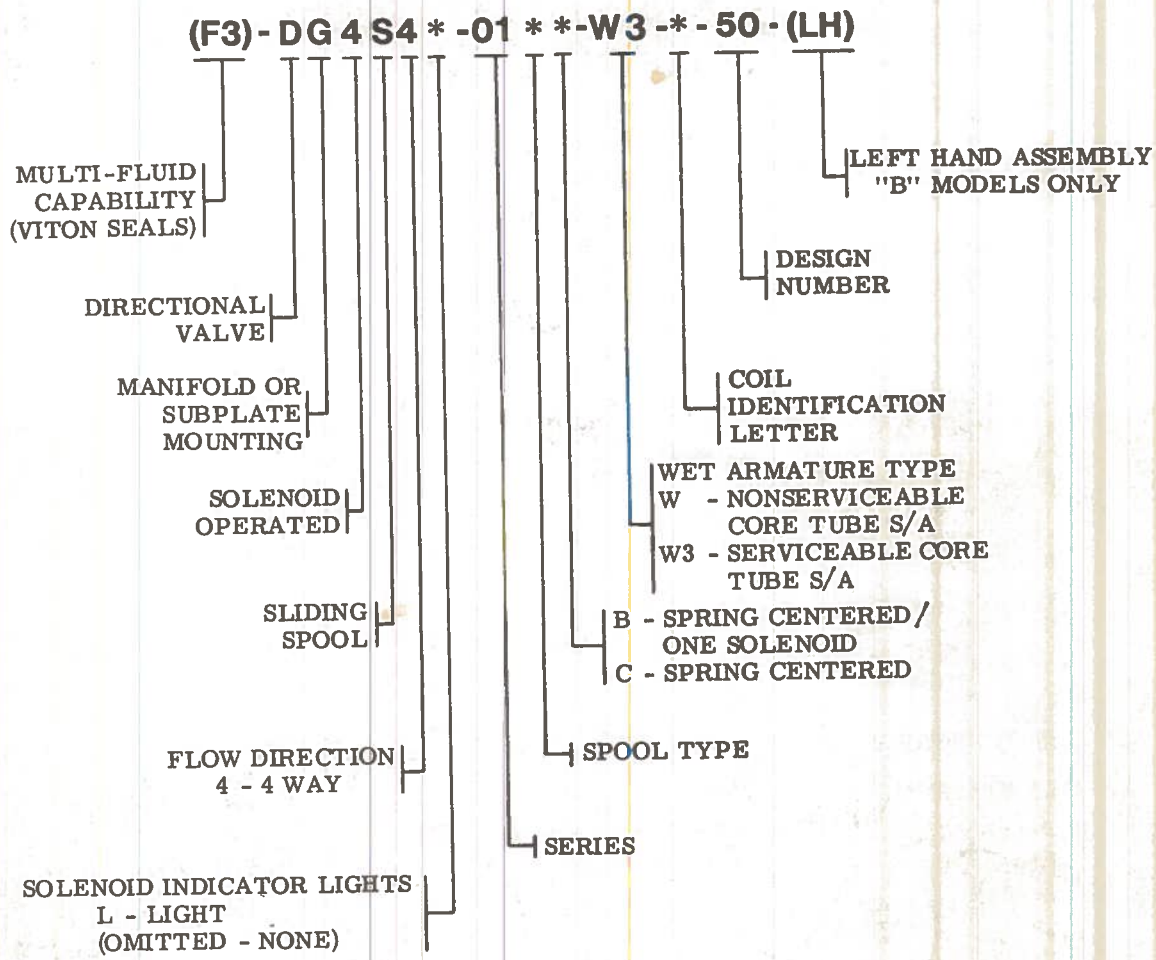
□INCLUDED IN 942465 FASTENER KIT

●INCLUDED IN COIL KIT

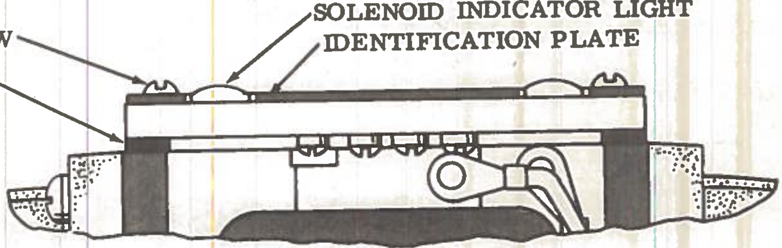
●COIL S/A	COIL KIT	AC VOLT/Hz	DC VOLT	COIL CODE
400823	942466	110/50, 115/60, 120/60		B
400824	942467	220/50, 230/60	—	D
400825	942468	440/50, 460/60		M
400826	942469	—	12	G
400827	942470		24	H
435755	941017	127/50	—	EG
582214	941109	—	250	X
730273	926461		48	J

*CAUTION
CORRECT ARMATURE AND POLE FACE MUST BE USED FOR AC AND DC OPERATION.

MODEL CODE BREAKDOWN



FOR MODELS WITH SOLENOID INDICATOR LIGHTS



SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617

NOTE
REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURE.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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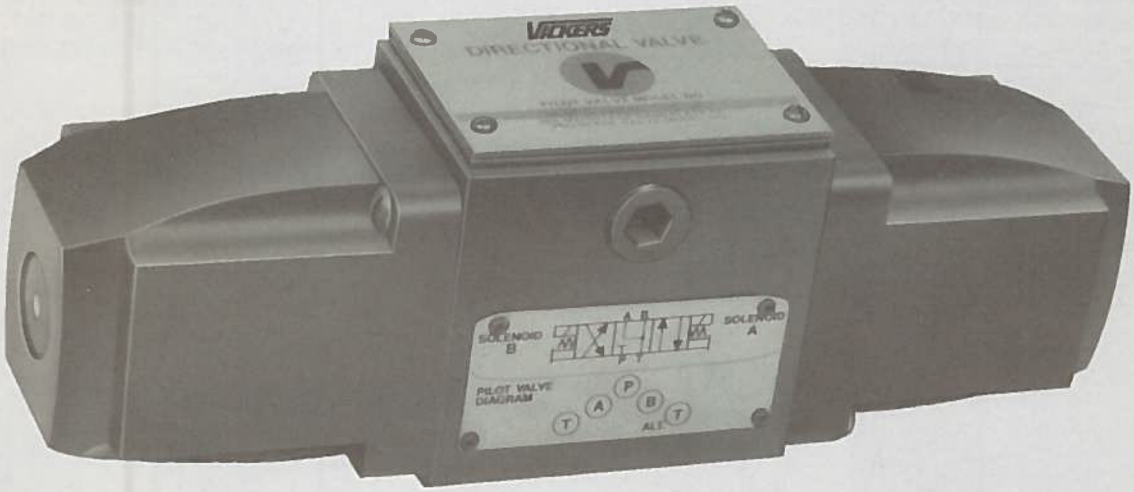
Service Parts Information

Wet Armature Solenoid Operated Directional Valves

DG4S*-01*N-W(3)-*-51



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Revised 12-1-87

I-3559-S

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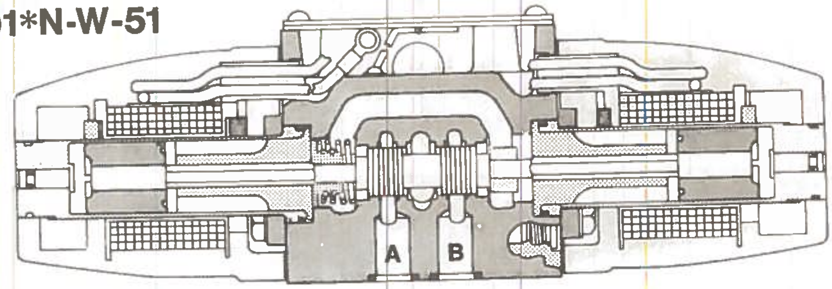
DG4S*-01*N-W-51



MODEL	SPOOL	DIAGRAM PLATE	SPOOL KIT
DG4S2-012N-W-*-51	463393	577485	940702
DG4S4-010N-W-*-51	587970	577486	940706
DG4S4-012N-W-*-51	587971		940707
DG4S4-016N-W-*-51	587972		940708
DG4S4-017N-W-*-51	587973		940709
DG4S4-0133N-W-*-51	587974		940710

SPOOL KIT INCLUDES SPOOL, DIAGRAM PLATE, SEAL KIT AND PARTS PREFIXED WITH A CLOSED SQUARE SYMBOL(■).

NOTE
PART NUMBERS PREFIXED WITH A SYMBOL ARE AVAILABLE ONLY AS SERVICE KITS.

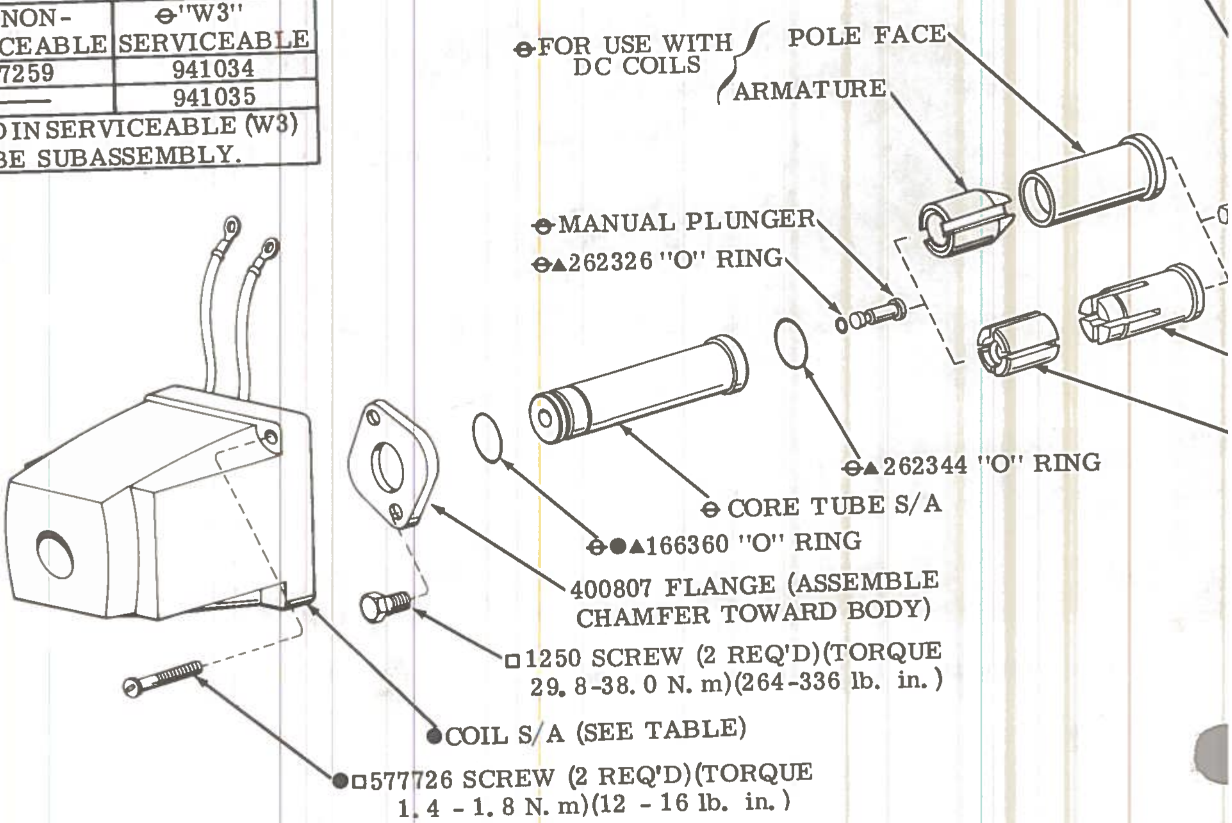
COIL TYPE	CORE TUBE S/A "W" NON-SERVICEABLE	CORE TUBE S/A ⊖"W3" SERVICEABLE
AC	587259	941034
DC	———	941035

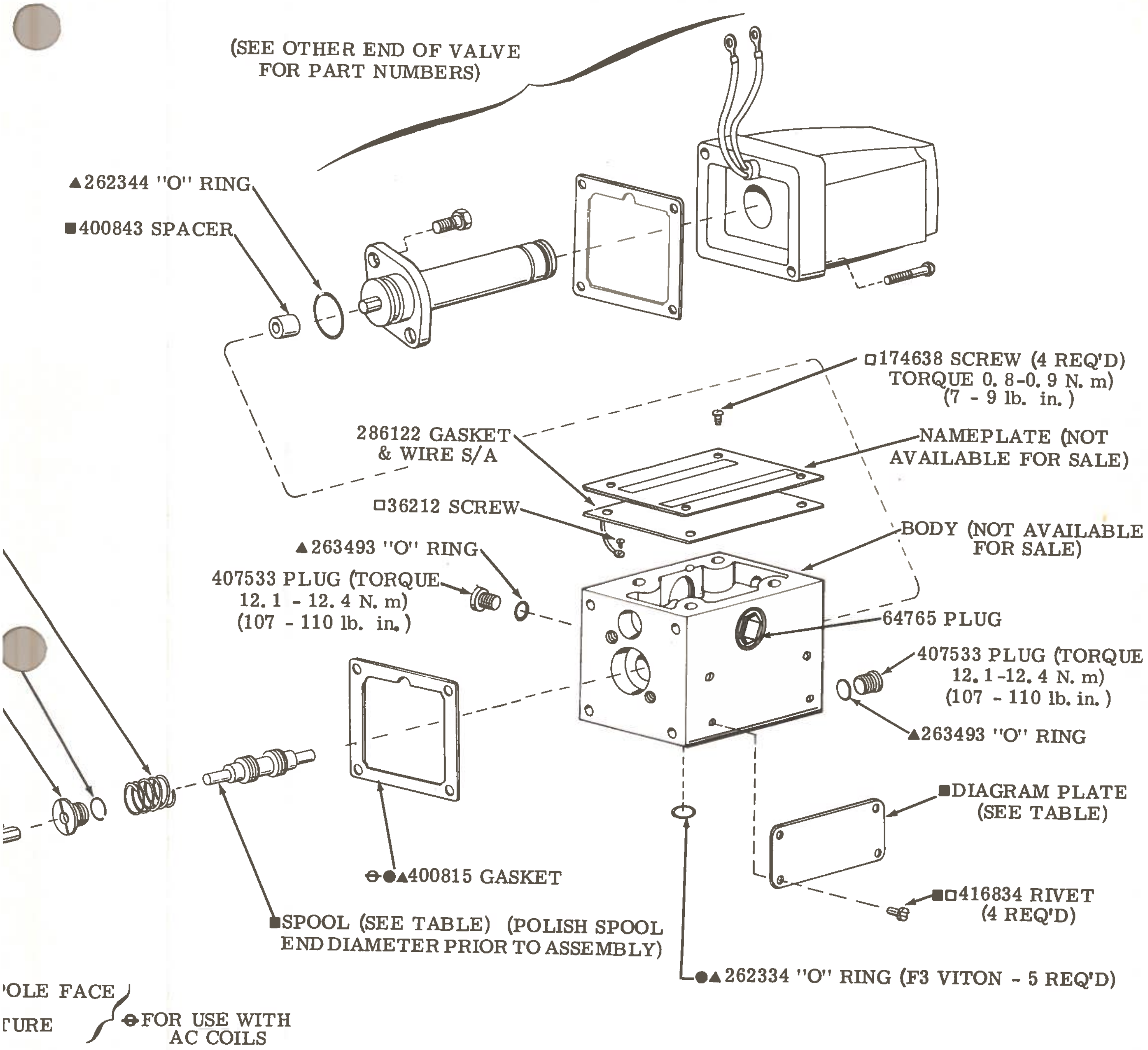
⊖ INCLUDED IN SERVICEABLE (W3) CORE TUBE SUBASSEMBLY.

▲SERVICE ALL UNITS W/F3 SEAL KIT 920109

△INCLUDED IN 941016 DETENT KIT

□INCLUDED IN FASTENER KIT 942465

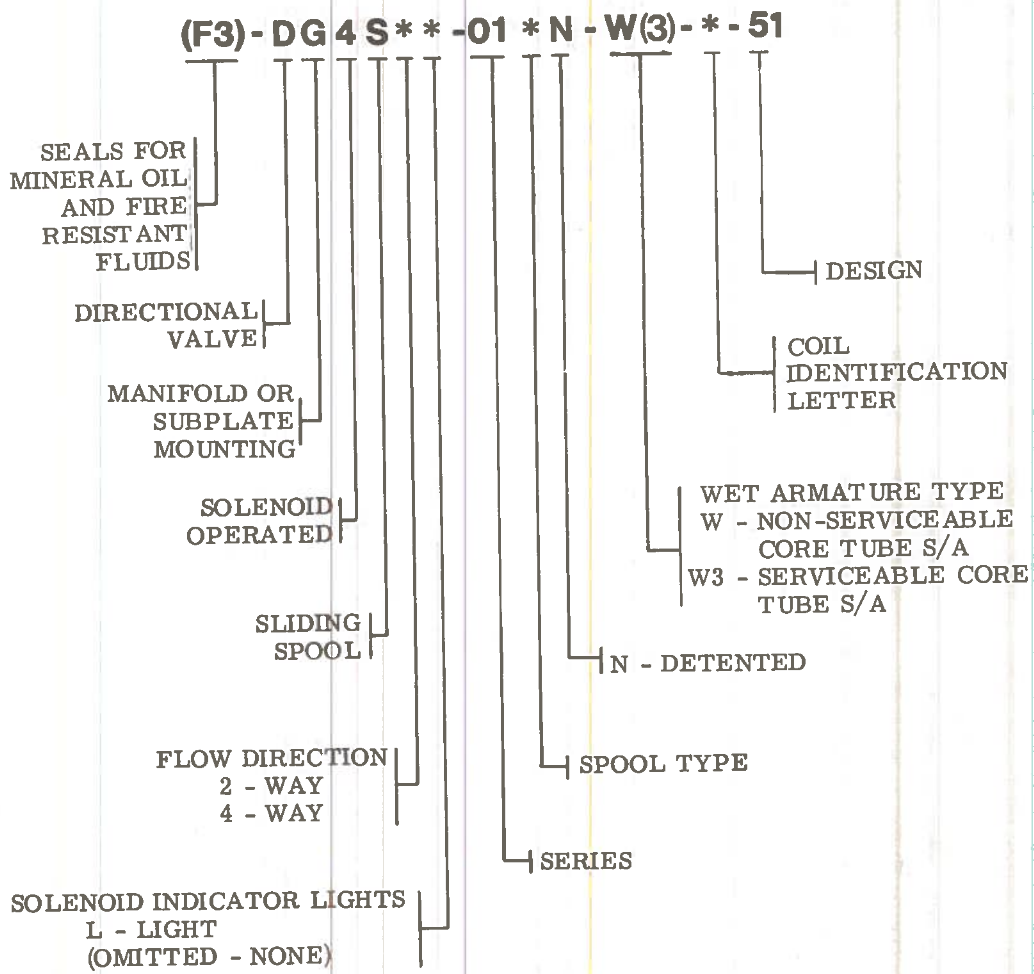




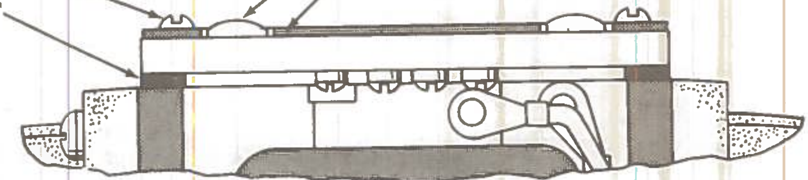
• INCLUDED IN COIL KIT					
• COIL S/A	COIL KIT	AC VOLT/Hz	DC VOLT	COIL CODE	DIN COIL
400823	942466	110/50, 115/60, 120/60		B	463328
400824	942467	220/50, 230/60		D	463329
400825	942468	440/50, 460/60		M	463330
400826	942469		12	G	463331
400827	942470		24	H	463332
435755	941017	127/50		EG	
582214	941109		250	X	617244
730273	926461		48	J	
		100/50, 100/60		T	977929
		380/50, 380/60		DZ	617370

*CAUTION
CORRECT ARMATURE AND POLE FACE MUST BE USED
FOR AC AND DC OPERATION.

MODEL CODE BREAKDOWN



FOR MODELS WITH SOLENOID INDICATOR LIGHTS



SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617

NOTE
REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURE.

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

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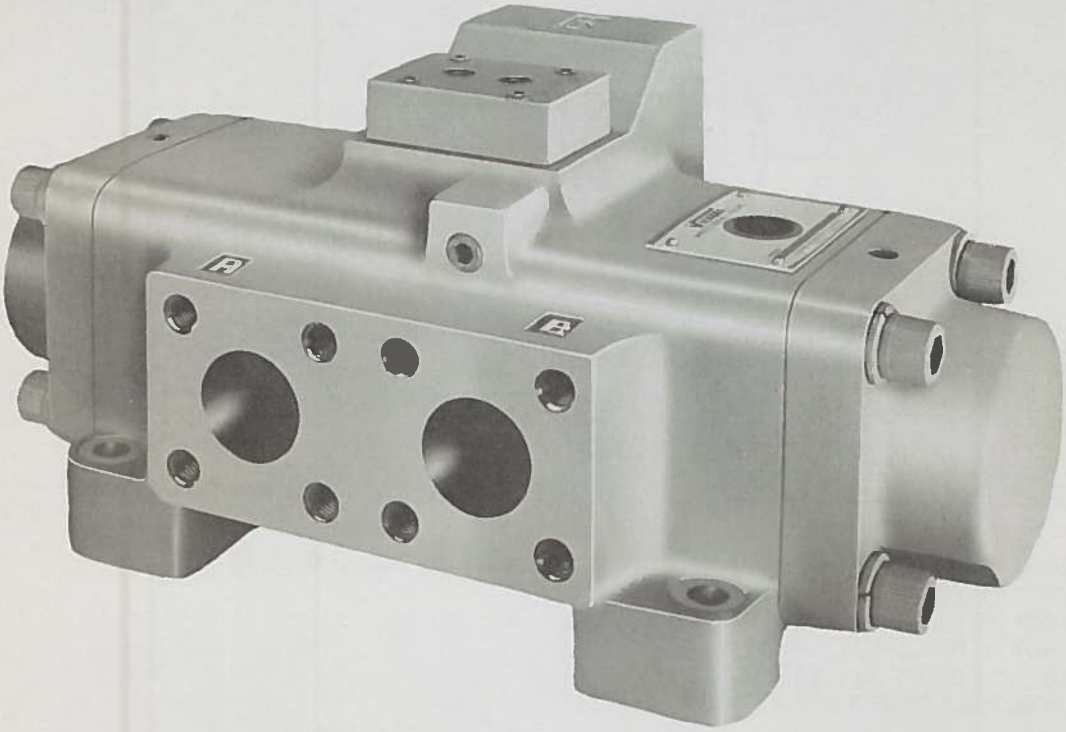
Service Parts Information

Pilot Operated Directional Control Valve

DF3S4-16**-*-53



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Revised 9-1-85

I-3561-S

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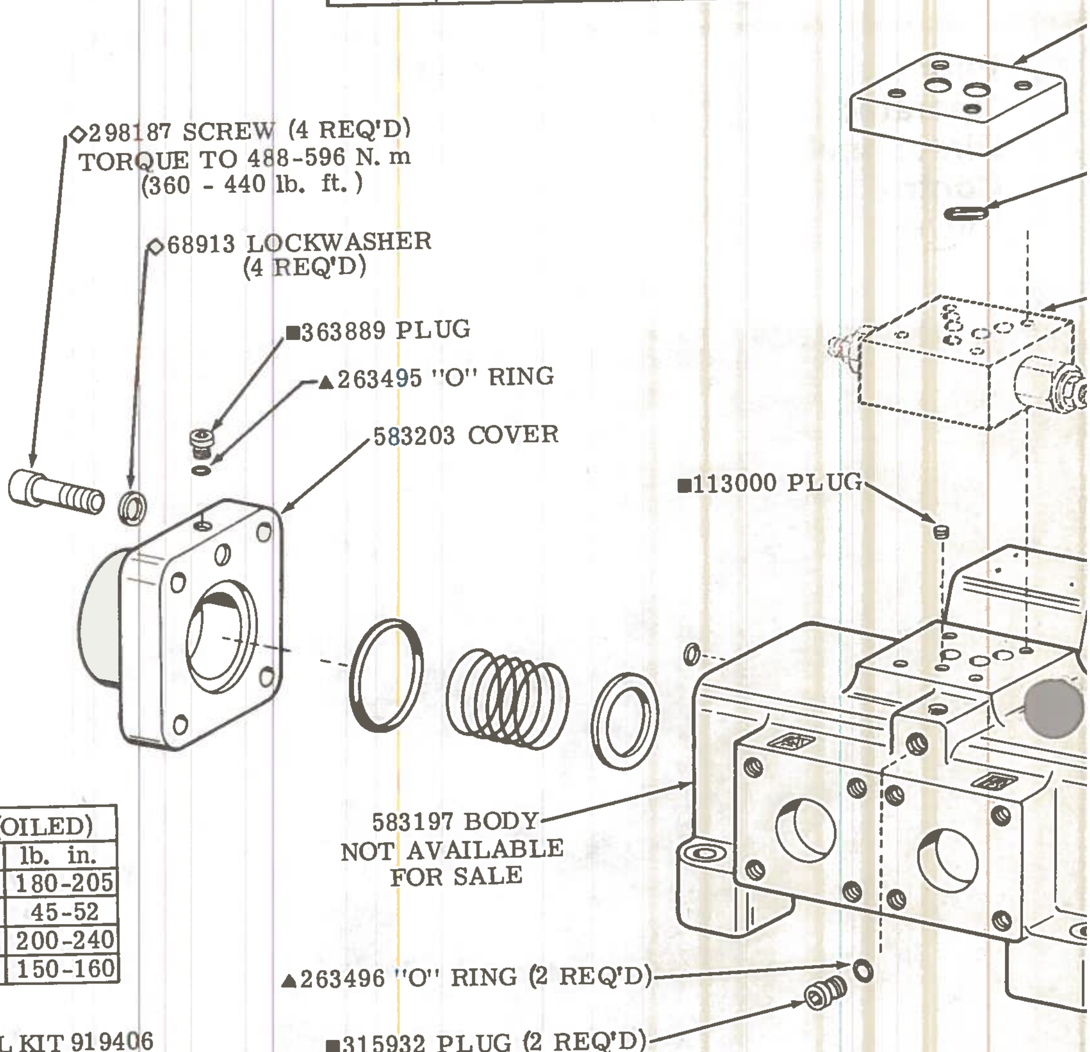
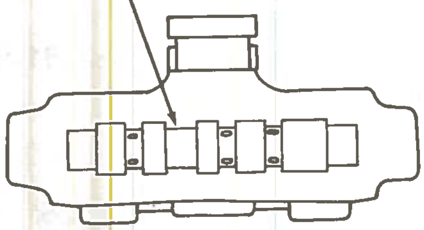
COVER ATTACHING BOLTS	
MODEL	BOLT (4 REQ'D)
W/PILOT CHOKE	⊠10937
W/OUT PILOT CHOKE	□ 1033
TORQUE TO 12.4 - 12.65 N. m (110 - 112 lb. in.)	



■PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
7075	20.0 -23.0	180-205
113000	5.0 - 5.9	45-52
315932	22.5 -27.0	200-240
363889	16.9 -18.0	150-160

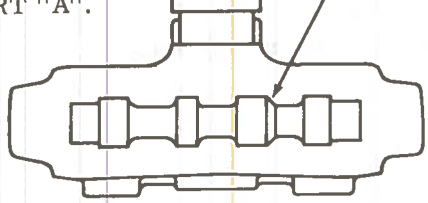
△▲INCLUDED IN STD. SEAL KIT 919406
F3 EQUIVALENT SEAL KIT 919410
◇INCLUDED IN FASTENER KIT 941309
□INCLUDED IN BOLT KIT 255651
⊠INCLUDED IN BOLT KIT 255637
■PLUG TORQUES (SEE TABLE)

ASSEMBLE TYPE 4 & 8 SPOOLS WITH WIDE UNDERCUT TOWARD "A" END



ASSEMBLE TYPE 1 & 3 SPOOLS WITH TAPER TOWARD "B" END

ASSEMBLE TYPE 31 SPOOL WITH TAPER TOWARD "A" END OF VALVE. "A" END IS DEFINED AS BEING CLOSEST TO CYL. PORT "A".

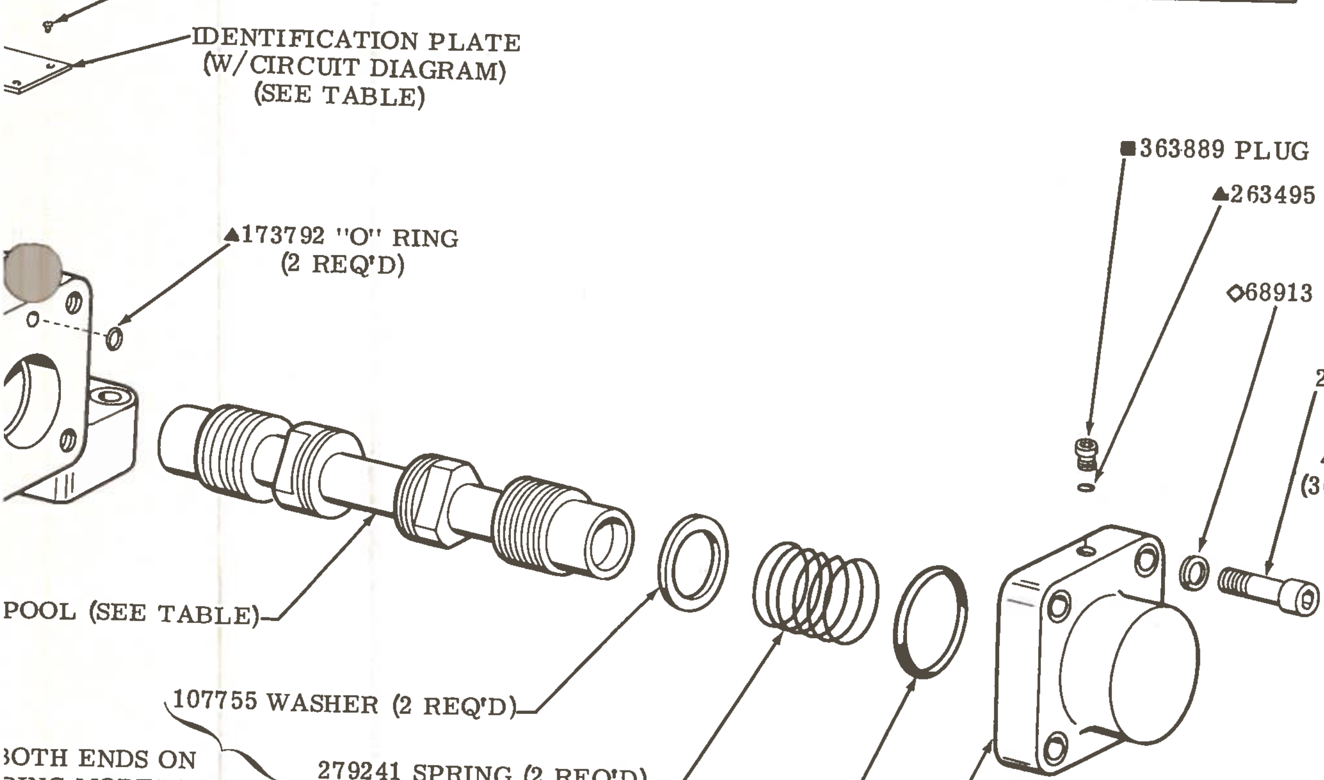


SPOOL ASSEMBLY NOTE

MODEL	SPOOL	IDENT. PLATE	
		"C"	NO-SPRING
DF3S4-160(C)-*-53	273677	400976	400975
DF3S4-161C-*-53	*386581	400977	———
DF3S4-162(C)-*-53	273676	400978	400975
DF5S4-163C-*-53	*275803	400979	———
DF3S4-164C-*-53	*273720	400980	
DF3S4-166(C)-*-53	275804	400981	400975
DF3S4-168C-*-53	*275805	400980	———
DF3S4-169(C)-*-53	275806	400976	400975
DF3S4-1631C-*-53	275803	580475	———
DF3S4-1633C-*-53	317777	400981	

* SEE SPOOL ASSEMBLY NOTE BELOW

NOTE
PART NUMBERS INCLUDED IN KITS
WILL NOT BE SOLD SEPARATELY



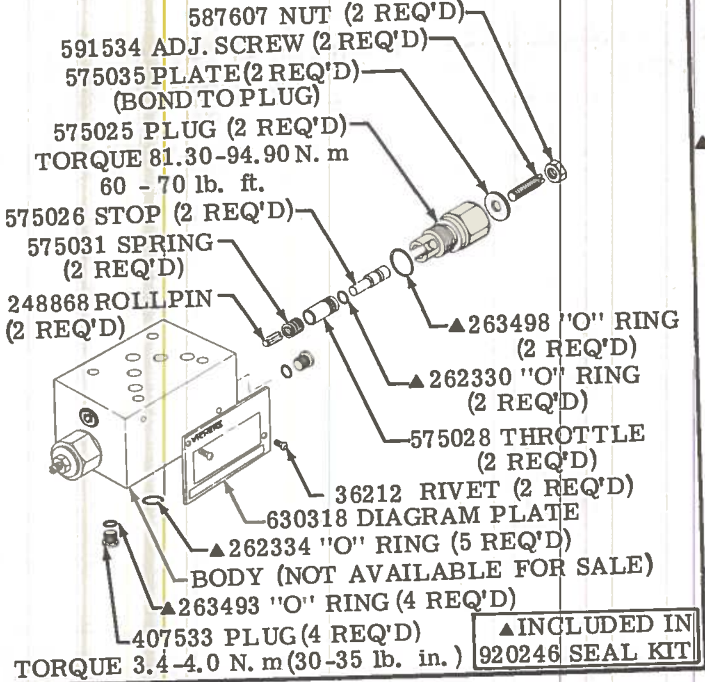
NOTE
SAE STRAIGHT THREAD PLUGS
USED ON EXTERIOR OF VALVE

▲INCLUDED IN
919406 SEAL KIT

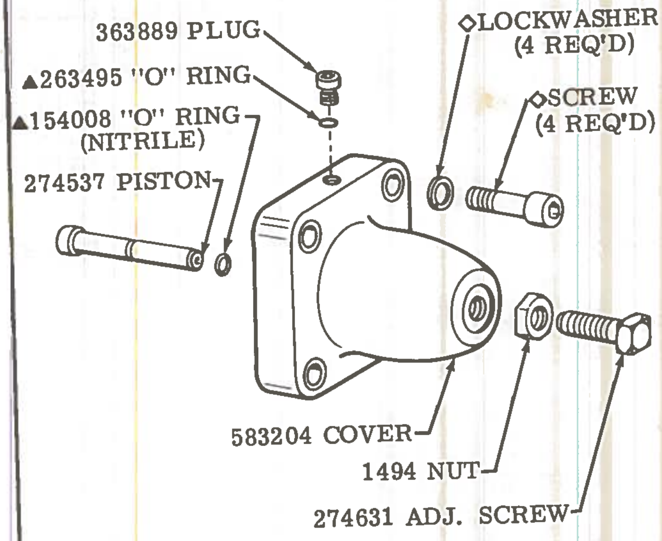
F3 EQUIVALENT
SEAL KIT 919410

SEE PARTS DRAWING I-3962-S
FOR CONNECTION FLANGES

MODELS WITH PILOT CHOKE
DGMFN-5-Y-AW-BW-20



STROKE ADJUSTMENT PARTS



MODEL CODE BREAKDOWN

(F3) D F 3 S 4 - 16 * * - * - 53

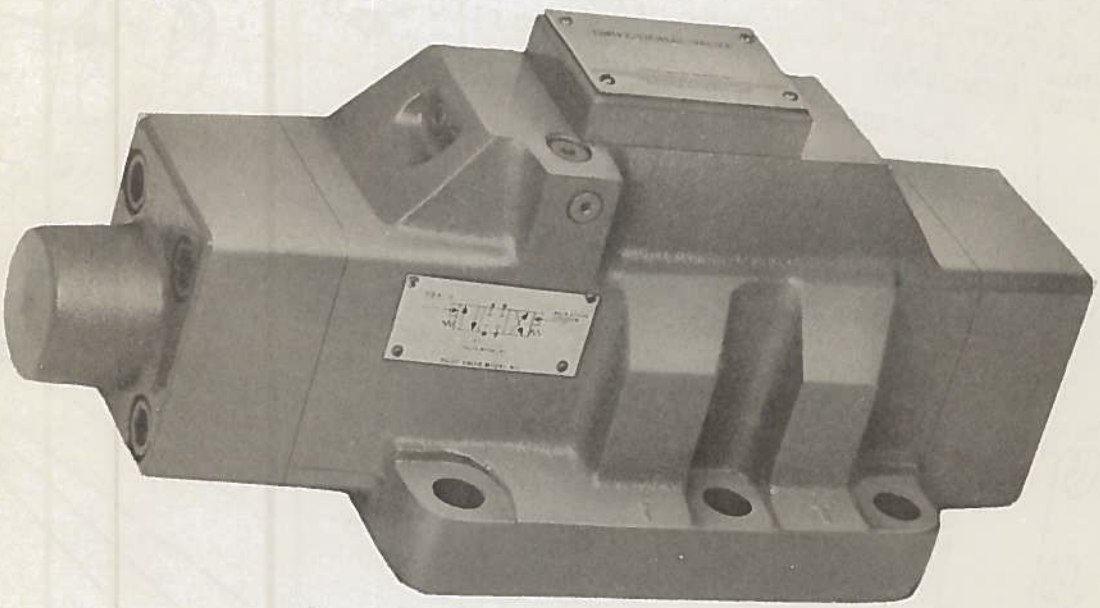
- (F3) — MULTI-FLUID CAPABILITY VITON SEALS
- D — DIRECTIONAL CONTROL VALVE
- F — FLANGE CONNECTIONS
- 3 — PILOT OPERATED
- S — SLIDING SPOOL
- 4 — FLOW DIRECTION
  4 - 4 WAY
- 16 — VALVE SIZE
  160 SERIES
  (2. 00 INCH)
- * — SPOOL TYPES
- * — C - SPRING CENTERED
  OMITTED-NO SPRING
- * — SPOOL CONTROL MODIFICATION (OMIT IF NOT REQUIRED)
  1 - STROKE ADJUSTMENT
  2 - PILOT CHOKE ADJUSTMENT
  3 - PILOT CHOKE & STROKE ADJ.
  7 - STROKE ADJ. - CYLINDER "A" END ONLY
  8 - STROKE ADJ. - CYLINDER "B" END ONLY
- 53 — DESIGN

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Par[t] Information

Spring Offset Pilot Operated Directional Valve

DG3S4–10*A(X)–*–*–53



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Revised 9-1-85

I–3563–S

A Libbey-Owens-Ford Company

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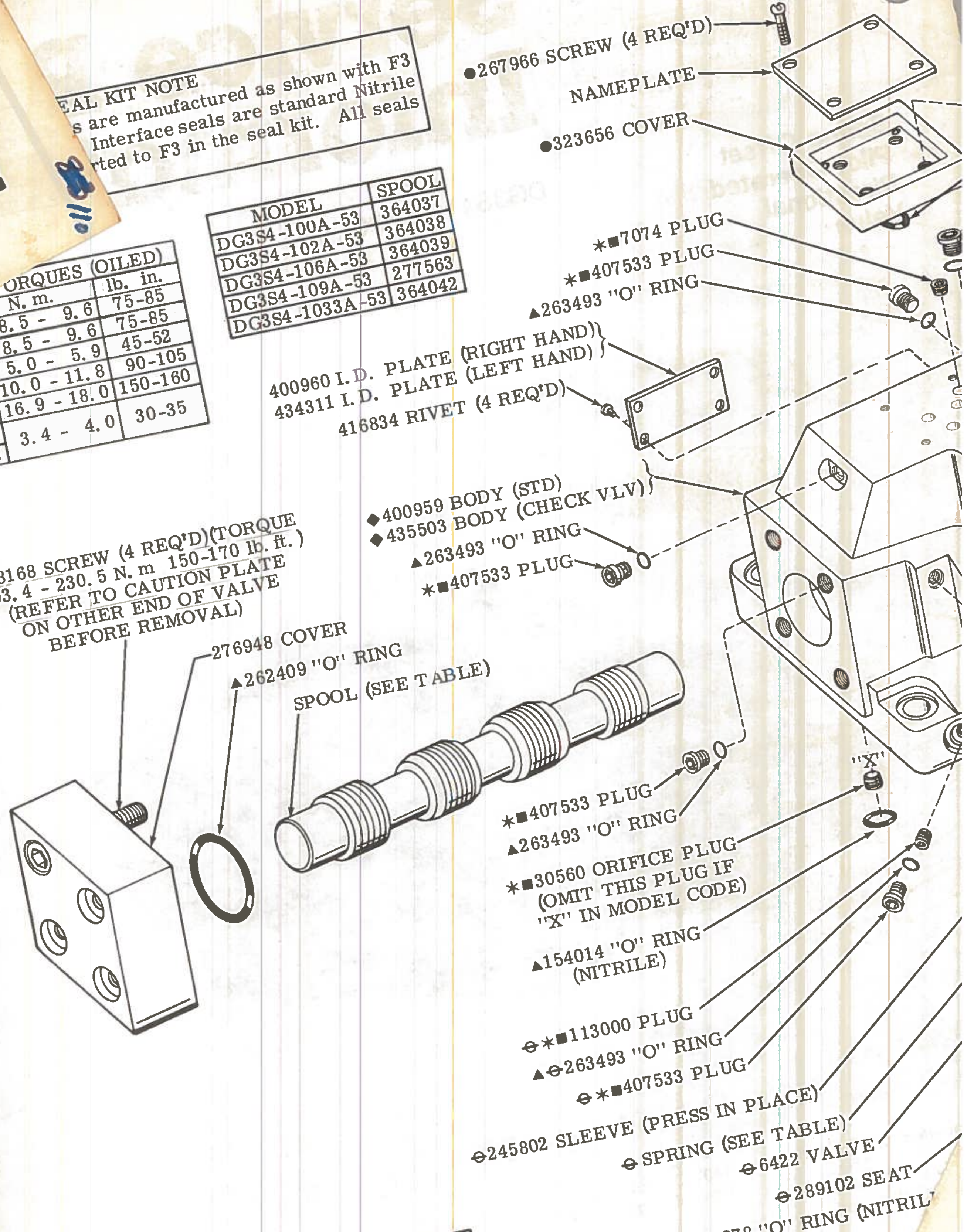
...EAL KIT NOTE

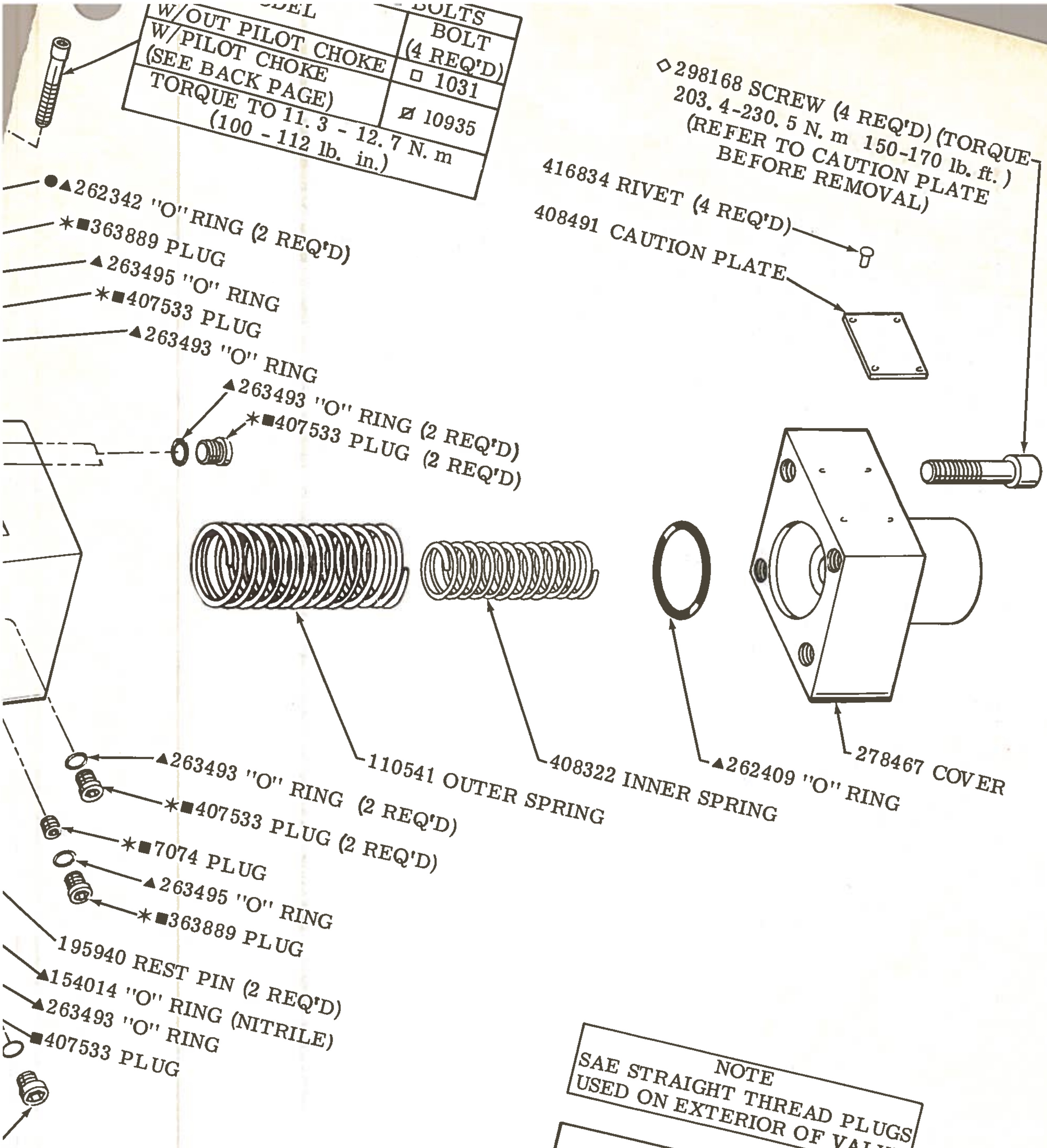
...s are manufactured as shown with F3 ... Interface seals are standard Nitrile ... All seals ...rted to F3 in the seal kit.

...LUG	TORQUES (OILED) N. m.	lb. in.
7074	8.5 - 9.6	75-85
30560	8.5 - 9.6	75-85
113000	5.0 - 5.9	45-52
343740	10.0 - 11.8	90-105
363889	16.9 - 18.0	150-160
398071	3.4 - 4.0	30-35
407533		

MODEL	SPOOL
DG3S4-100A-53	364037
DG3S4-102A-53	364038
DG3S4-106A-53	364039
DG3S4-109A-53	277563
DG3S4-1033A-53	364042



MODEL	SPRING
DG3S4-10*A-K-53	⊖247287
DG3S4-10*A-L-53	⊖247288
DG3S4-10*A-R-53	⊖276428
DG3S4-10*A-S-53	⊖432353

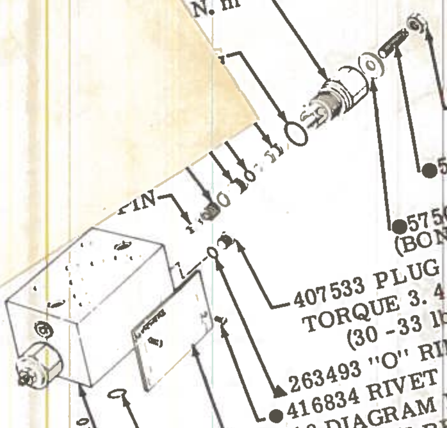


NOTE
SAE STRAIGHT THREAD PLUGS USED ON EXTERIOR OF VALVE

NOTE
PART NUMBERS INCLUDED IN KITS WILL NOT BE SOLD SEPARATELY.

▲ INCLUDED IN F3 SEAL KIT 920150
□ INCLUDED IN FASTENER KIT 941257
◇ INCLUDED IN FASTENER KIT 941262
⌀ INCLUDED IN BOLT KIT 255620
● INCLUDED IN COVER KIT 942024
✶ INCLUDED IN PLUG KIT 941263
■ PLUG TORQUES (SEE TABLE)
◆ NOT AVAILABLE FOR SALE
⊖ USED ON CHECK VALVE MODELS ONLY

NOTE
RIGHT HAND ASSEMBLY SHOWN. FOR LEFT HAND ASSEMBLY, END COVERS AND SPRINGS ARE REVERSED AND I. D. PLATE CHANGED TO L. H. Ex. DG3S4-100A-53-LH.

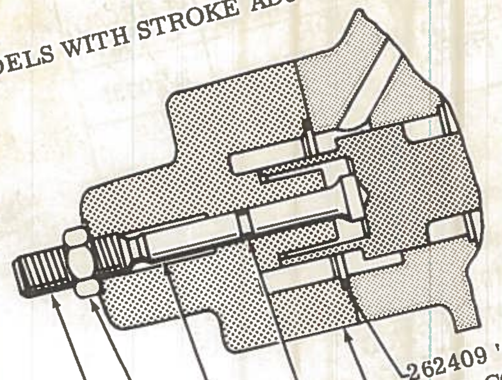


◆ORDER COMPLETE CHOKE (DGMFN-5-Y-AW-BW-20) IF BODY IS REQUIRED.

●QTY. 2 REQ'D

▲INCLUDED IN 920246 SEAL KIT

MODELS WITH STROKE ADJUSTMENT



MODEL CODE BREAKDOWN

(F3) DG 3 S 4 - 10 * A (X) - * - * - 53 - (LH)

- (F3) — MULTI-FLUID CAPABILITY (VITON SEALS)
- DG — DIRECTIONAL CONTROL VALVE
- (D G) — SUBPLATE OR MANIFOLD MOUNTED
- 3 — PILOT OPERATED
- S — SLIDING SPOOL
- 4 — FLOW DIRECTION 4 - 4 WAY
- 10 — VALVE SIZE 100 SERIES (1.250 INCH)
- * — SPOOL TYPES
- A — SPRING OFFSET
- (X) — "X" - FAST RESPONSE MOD[...]; OMITTED - LOW SHOCK MO[...]
- * — SPOOL CONTROL MODIFICATIO[...] (OMIT IF NOT REQUIRED)
  - 2 - PILOT CHOKE ADJUSTME[...]
  - 7 - STROKE ADJ. - CYLINDE[...] ONLY (RIGHT HAND MOD[...]
  - 8 - STROKE ADJ. - CYLINDE[...] ONLY (LEFT HAND MOD[...]
  - 2-7 - IF BOTH ARE REQUIR[...]
  - 2-8 - IF BOTH ARE REQUIR[...]
- * — CHECK VALVE
  - K - 5 PSI (0.35 bar) CRACKING PR[...]
  - L - 35 PSI (2.4 bar) CRACKING P[...]
  - R - 50 PSI (3.45 bar) CRACKING P[...]
  - S - 75 PSI (5.2 bar) CRACKING P[...]
  - OMITTED - NO CHECK VALVE
- 53 — DESIGN
- (LH) — OFFSET TO "B" OMIT FOR STD. OFFSET TO "A" MODELS

For satisfactory service life of these components, use full flow filtration [...] cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and O[...]